

# Nalloy, LLC

REVISED TEST REPORT TO 104760-8A

Model: XVZQ49

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.247  
(FHSS 902-928MHz)

Report No.: 104760-8B

Date of issue: March 22, 2022



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.01

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## ADMINISTRATIVE INFORMATION

### Test Report Information

**REPORT PREPARED FOR:**

Nalloy, LLC  
2301 5th Avenue  
Seattle, WA 98108

Representative: Naga Suryadevara  
Customer Reference Number: 2D-04568090

**REPORT PREPARED BY:**

Darcy Thompson  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Project Number: 104760

**DATE OF EQUIPMENT RECEIPT:**

December 11, 2020

**DATE(S) OF TESTING:**

December 11, 14, and 17, 2020  
February 17, 2021

### Revision History

**Original:** Testing of the Model: XVZQ49 to 15.207 & 15.247 (FHSS)

**Revision A:** To add Appendix for test set up photos. Update test method in section 15.247(b).

**Revision B:** To replace 15.207 AC Conducted Emissions data.

### Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm  
Director of Quality Assurance & Engineering Services  
CKC Laboratories, Inc.

## Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

### TEST LOCATION(S):

CKC Laboratories, Inc.  
 Canyon Park  
 22116 23rd Drive S.E., Suite A  
 Bothell, WA 98021

## Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

## Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	A-0136

\*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

## SUMMARY OF RESULTS

### Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	PASS
15.247(a)(1)	Carrier Separation	NA	PASS
15.247(a)(1)(i)	Number of Hopping Channels	NA	PASS
15.247(a)(1)(i)	Average Time of Occupancy	NA	PASS
15.247(b)(2)	Output Power	NA	PASS
15.247(d)	RF Conducted Emissions & Band Edge	NA	PASS
15.247(d)	Radiated Emissions & Band Edge	NA	PASS
15.207	AC Conducted Emissions	NA	PASS

NA = Not Applicable

#### ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

## Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

#### Summary of Conditions

No modifications were made during testing.

## Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

#### Summary of Conditions

None

## EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

### Configuration 1

*Equipment Tested:*

Device	Manufacturer	Model #	S/N
NA	Nalloy, LLC	XVZQ49	(FCC ID 2AVOB-XVZQ49)

*Support Equipment:*

Device	Manufacturer	Model #	S/N
PoE Injector	Ubiquiti	GP-C500-120G	XVZQ49

### Configuration 2

*Equipment Tested:*

Device	Manufacturer	Model #	S/N
NA	Nalloy, LLC	XVZQ49	(FCC ID 2AVOB-XVZQ49)

*Support Equipment:*

Device	Manufacturer	Model #	S/N
PoE Injector	Allnet	ALL048900V2	NA
Switching Power Supply (For PoE Injector)	Fuyuang	FY5502000	NA

### Configuration 3

*Equipment Tested:*

Device	Manufacturer	Model #	S/N
NA	Nalloy, LLC	XVZQ49	(FCC ID 2AVOB-XVZQ49)

*Support Equipment:*

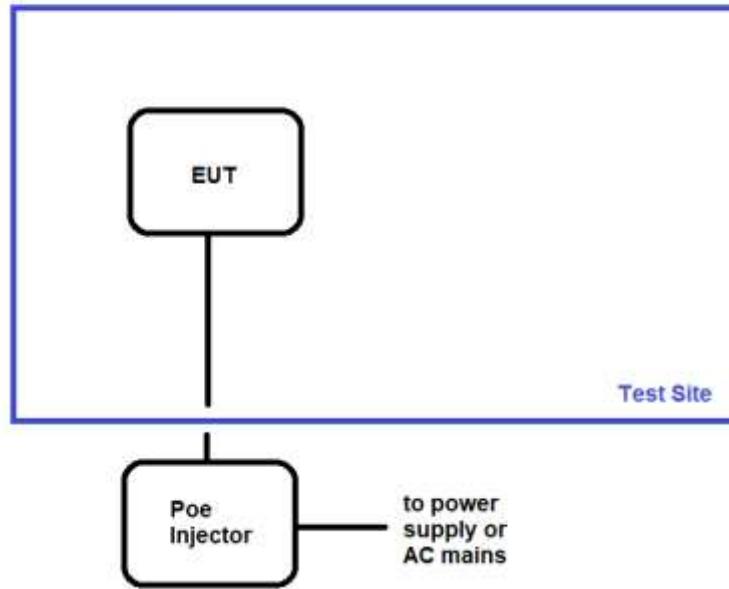
Device	Manufacturer	Model #	S/N
PoE Injector	Allnet	ALL048900V2	NA
Switching Power Supply (For PoE Injector)	Fuyuang	FY5502000	NA
Laptop	Lenovo	130S-11IGM	NA
Power Supply (for Laptop)	Lenovo	ADL45WCC	NA
Power Supply (for Module)	Maxtra	MA-305D	P7354

## General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Proprietary FHSS
Operating Frequency Range:	902.4-927.6MHz
Number of Hopping Channels:	64
Receiver Bandwidth and Synchronization:	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
Modulation Type(s):	GFSK-2
Maximum Duty Cycle:	100% as worst case
Number of TX Chains:	2
Antenna Type(s) and Gain:	Swivel Type Dipole, 2.5dBi declared per manufacturer
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	Module Input (3.3V nominal)
Firmware / Software used for Test:	Railtest_v2.2.0 Realterm 2.0.0.70

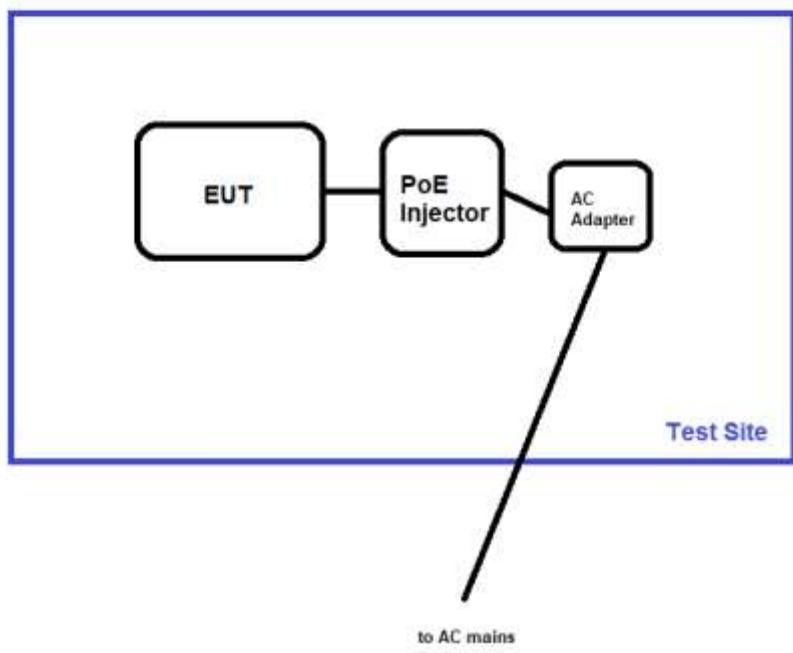
## Block Diagram of Test Setup(s)

**Test Setup Block Diagram**



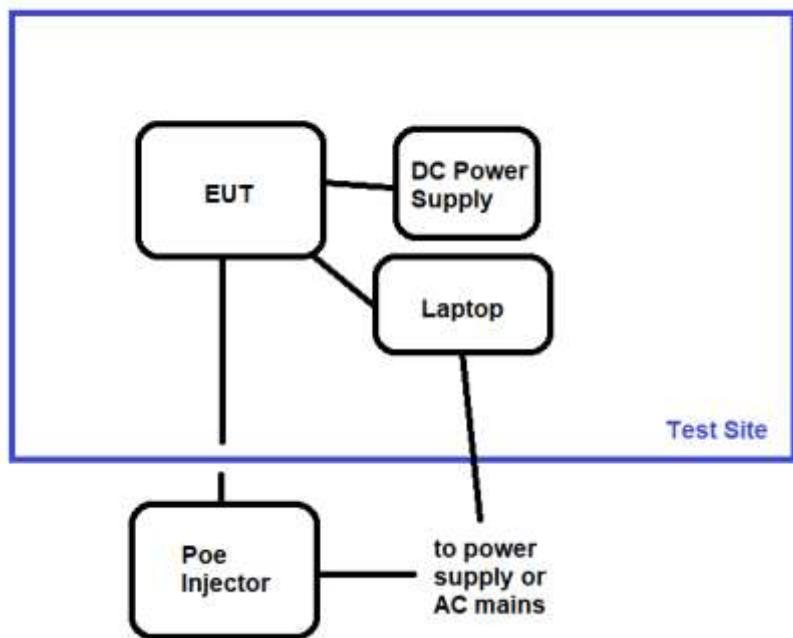
Configuration 1

### Test Setup Block Diagram



Configuration 2

### Test Setup Block Diagram



Configuration 3

## FCC Part 15 Subpart C

### 15.247(a)(1)(i) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Atkinson/M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/14/2020, 12/17/2020
Configuration:	1		
Test Setup:	EUT is continuously transmitting. EUT has 2 antenna ports, only 1 can be used at a time. Investigated both antenna ports, worst case data reported. Spectrum analyzer and appropriate attenuation connected to antenna port under test, external antenna is removed to make direct RF conducted measurements.		

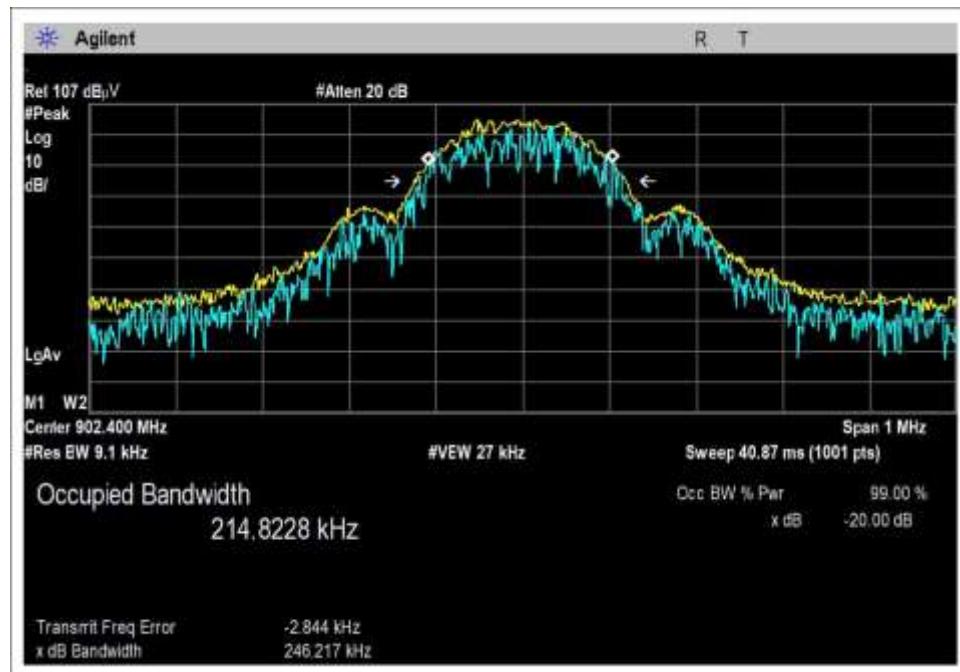
Environmental Conditions			
Temperature (°C)	19-22	Relative Humidity (%):	34-40

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
P06007	Cable	Andrew	Heliax	1/20/2020	1/20/2022
P05748	Attenuator	Pasternack	PE7004-20	3/4/2020	3/4/2022

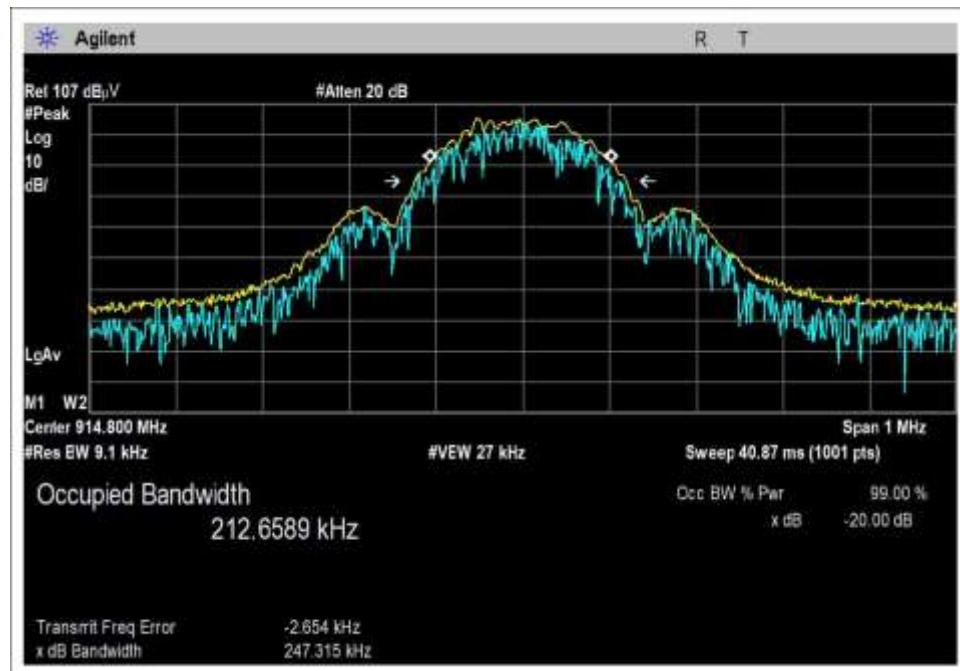
### 15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
902.4	0	GFSK-2	246.217	≤500	Pass
914.8	0	GFSK-2	247.315	≤500	Pass
927.6	0	GFSK-2	247.205	≤500	Pass
902.4	1	GFSK-2	247.720	≤500	Pass
914.8	1	GFSK-2	247.597	≤500	Pass
927.6	1	GFSK-2	247.209	≤500	Pass

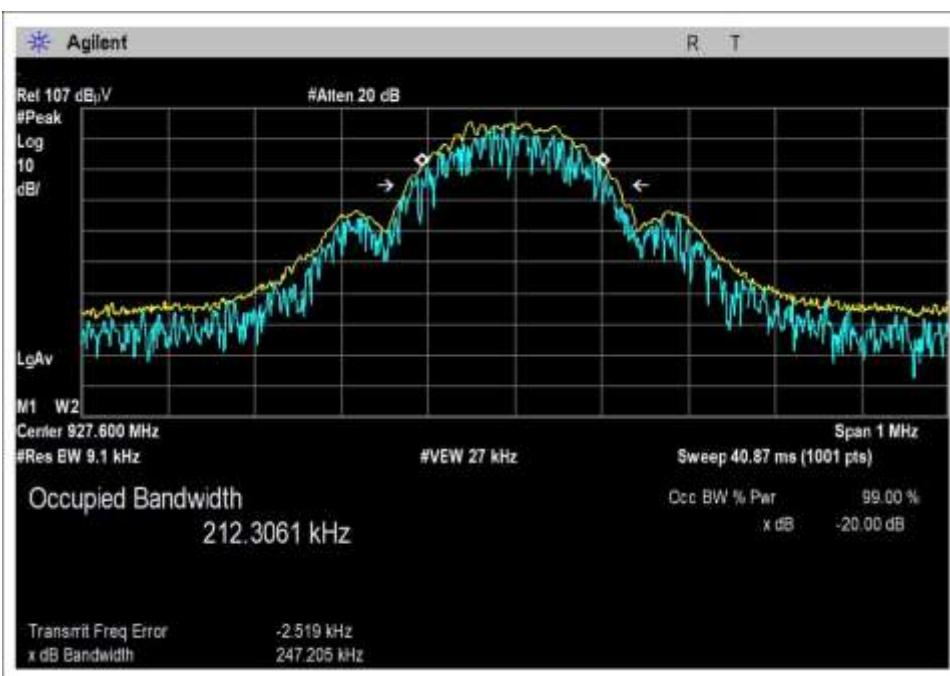
## Plot(s)



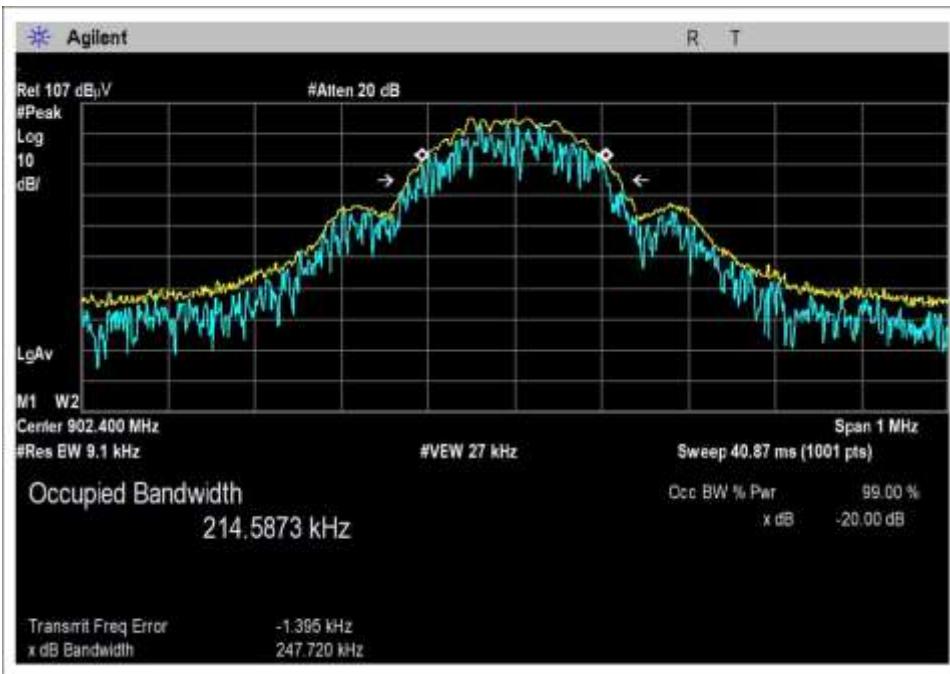
Low Channel, Antenna Port 0



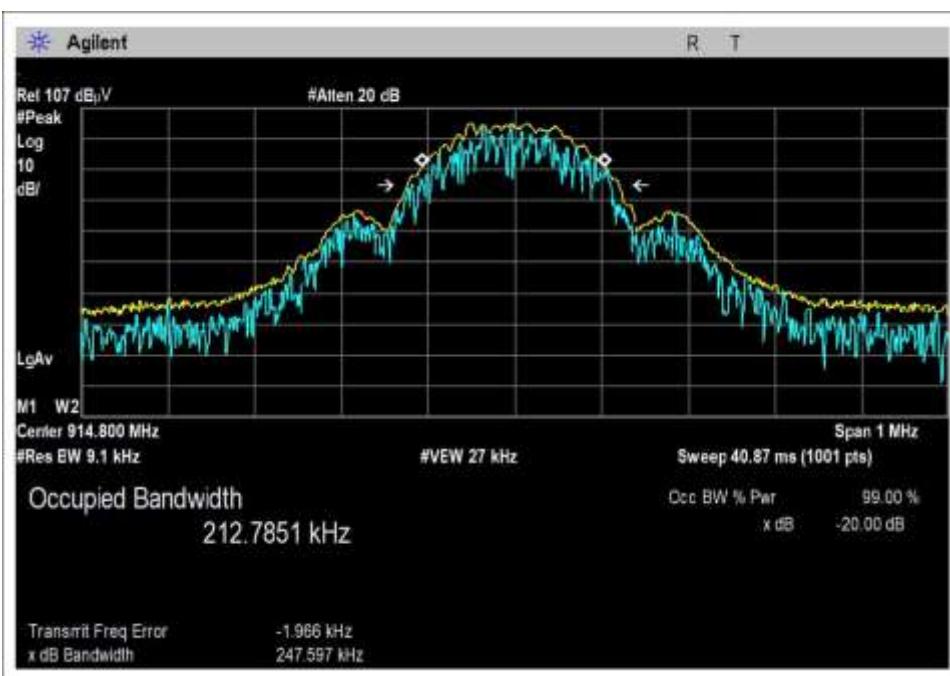
Middle Channel, Antenna Port 0



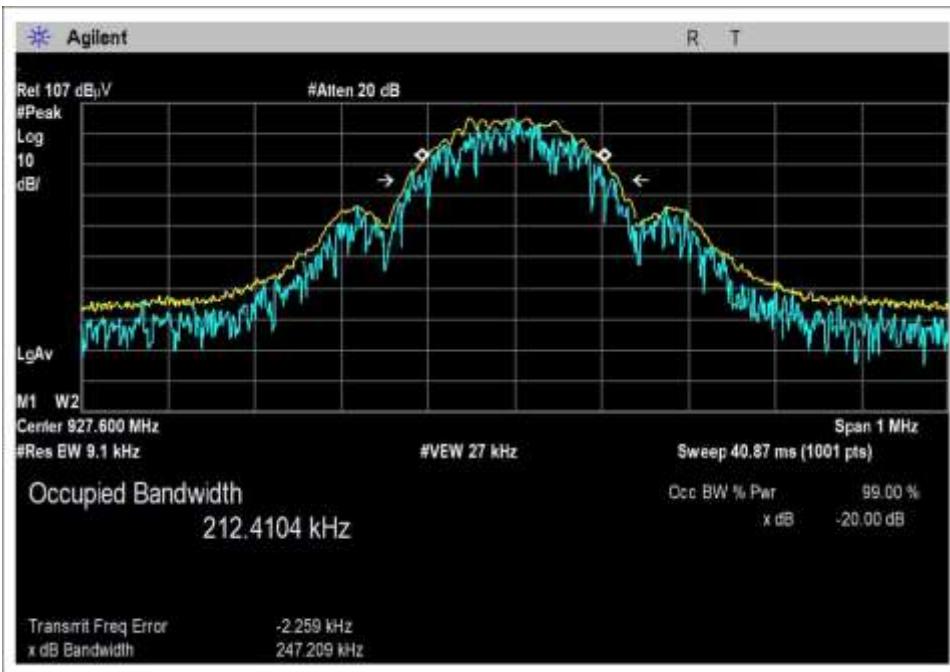
High Channel, Antenna Port 0



Low Channel, Antenna Port 1



Middle Channel, Antenna Port 1



High Channel, Antenna Port 1

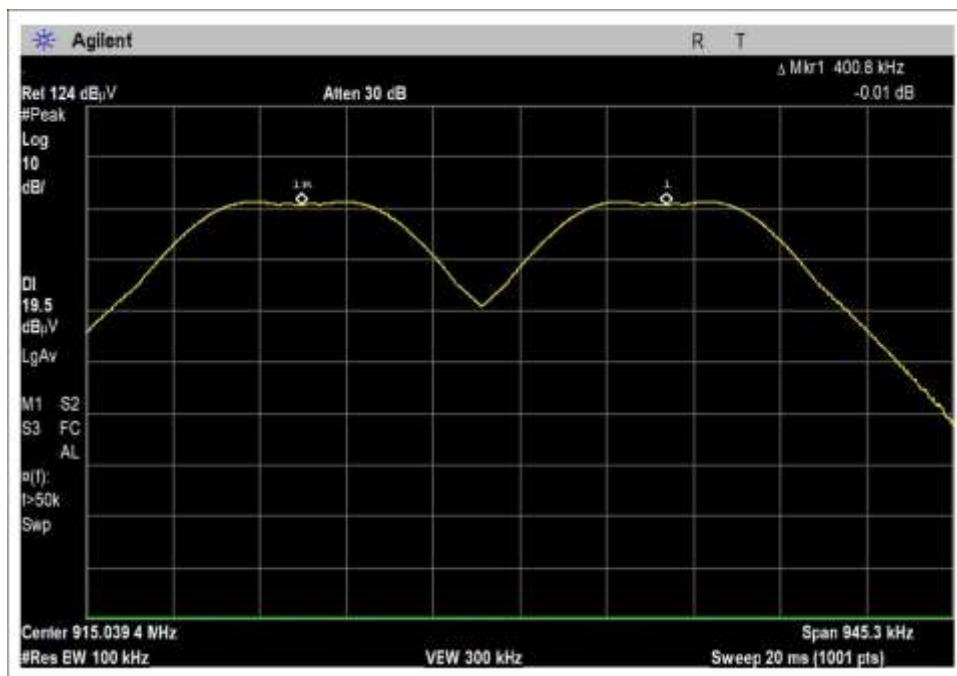
## 15.247(a)(1) Carrier Separation

### Test Data Summary

Limit applied: 20dB bandwidth of the hopping channel.

Antenna Port	Operational Mode	Measured (kHz)	Limit (kHz)	Results
0, 1	Continuously Transmitting	400.8	>247.720	Pass

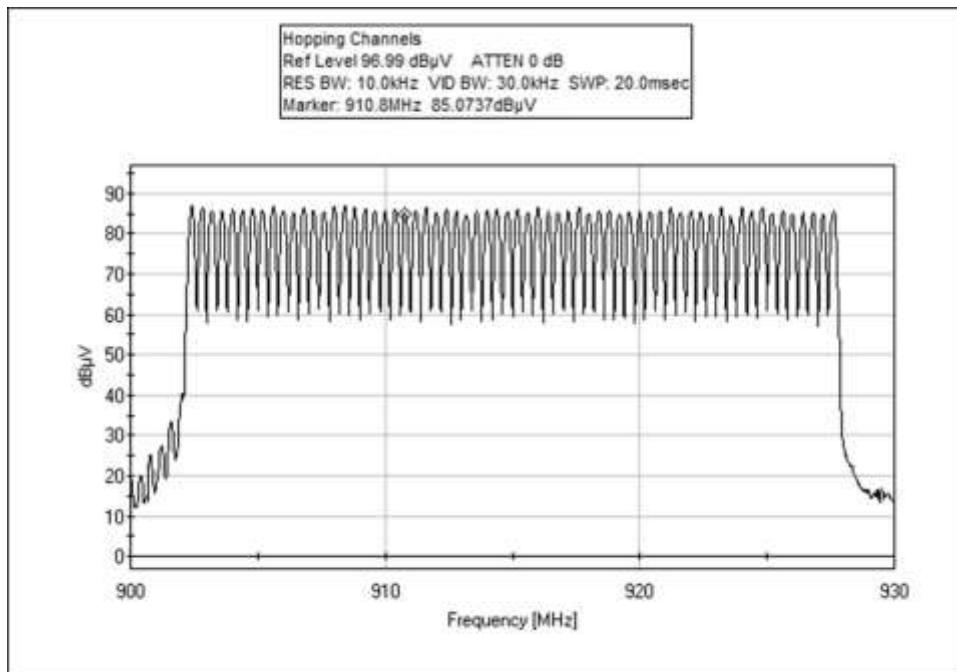
### Plot(s)



### 15.247(a)(1)(i) Number of Hopping Channels

Test Data Summary				
Antenna Port	Operational Mode	Measured (Channels)	Limit (Channels)	Results
0, 1	Continuously Transmitting	64	≥ 50	Pass

### Plot(s)



### 15.247(a)(1)(i) Time of Occupancy

Test Data Summary				
Observation Period, $P_{obs}$ is derived from the following:				
$P_{obs} = \begin{cases} 20 \text{ Seconds} &  20 \text{ dB BW} < 250 \text{kHz} \\ 10 \text{ Seconds} &  20 \text{ dB BW} \geq 250 \text{kHz} \end{cases}$				
Antenna Port	Operational Mode	Measured (ms)	Limit (ms/ $P_{obs}$ )	Results
0, 1	Continuously Transmitting	303.2	$\leq 400$	Pass

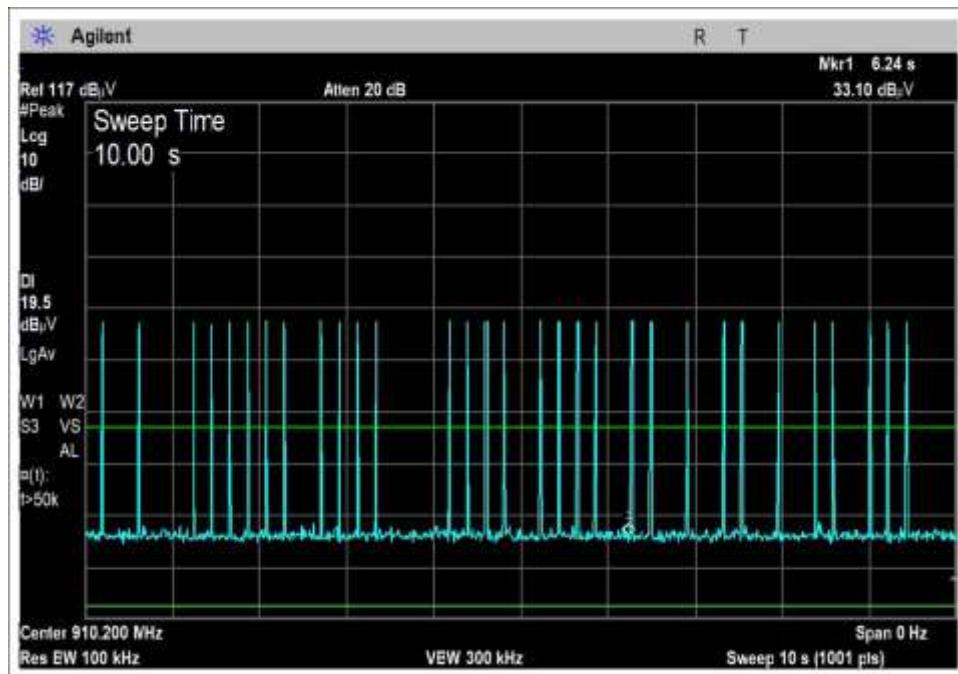
Measured results are calculated as follows:

$$Dwell \text{ time} = \left( \sum_{Bursts} RF \text{ Burst On Time} + \sum_{Control} Control \text{ Signal On time} \right) \Big|_{P_{obs}}$$

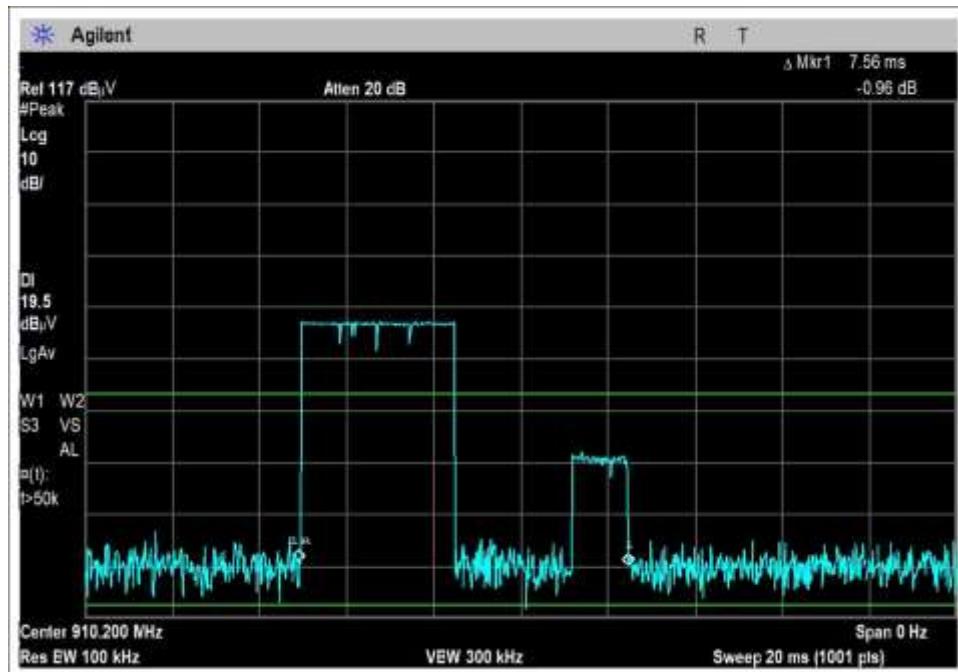
Actual Calculated Values:

Parameter	Value
Observation Period ( $P_{obs}$ ):	20s
Number of RF Bursts / $P_{obs}$ :	62
On time of RF Burst:	4.89ms
Number of Control or other signals / $P_{obs}$ :	0
On time of Control or other Signals:	0
Total Measured On Time:	303.2ms

## Plot(s)



7.56ms Pulse, 10s



7.56ms Pulse

Total On Time Measured = 7.56ms - (35.2mm/99.66mm) \* 7.56ms = 4.89ms On Time

## 15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Atkinson/M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/14/2020, 12/17/2020, and 2/17/2021
Configuration:	1 and 3		
Test Setup:	EUT is continuously transmitting. EUT has 2 antenna ports, only 1 can be used at a time. Measurements collected on both antenna ports. Spectrum analyzer and appropriate attenuation connected to antenna port under test, external antenna is removed to make direct RF conducted measurements.  Manufacturer declares this module will always be used with the internal attached UFL to SMA cable.  Configuration 3 used for voltage variation only.		

Environmental Conditions			
Temperature (°C)	19-22	Relative Humidity (%):	34-40

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02673	Spectrum Analyzer	Agilent	E4446A	2/22/2019	2/22/2021
P06007	Cable	Andrew	Heliax	1/20/2020	1/20/2022
P05748	Attenuator	Pasternack	PE7004-20	3/4/2020	3/4/2022
01318	Multimeter	Fluke	Fluke 85	7/22/2019	7/22/2021
02871	Spectrum Analyzer	Agilent	E4440A	3/12/2020	3/12/2022
P06008	Cable	Andrew	Heliax	2/1/2021	2/1/2023
P05747	Attenuator	Pasternack	PE7004-20	7/1/2020	7/1/2022

### Test Data Summary - Voltage Variations

Frequency (MHz)	Ant Port	V <sub>Minimum</sub> (dBm)	V <sub>Nominal</sub> (dBm)	V <sub>Maximum</sub> (dBm)	Max Deviation from V <sub>Nominal</sub> (dB)
902.4	0	18.4	19.0	18.9	0.6
914.8	0	18.5	19.0	19.0	0.5
927.6	0	18.3	19.0	19.0	0.7
902.4	1	18.4	19.0	19.0	0.6
914.8	1	18.4	19.0	19.0	0.6
927.6	1	18.4	19.0	19.0	0.6

Test performed using operational mode with the highest output power, representing worst case.

**Parameter Definitions:**

Measurements performed at input voltage V<sub>Nominal</sub> ± 15%.

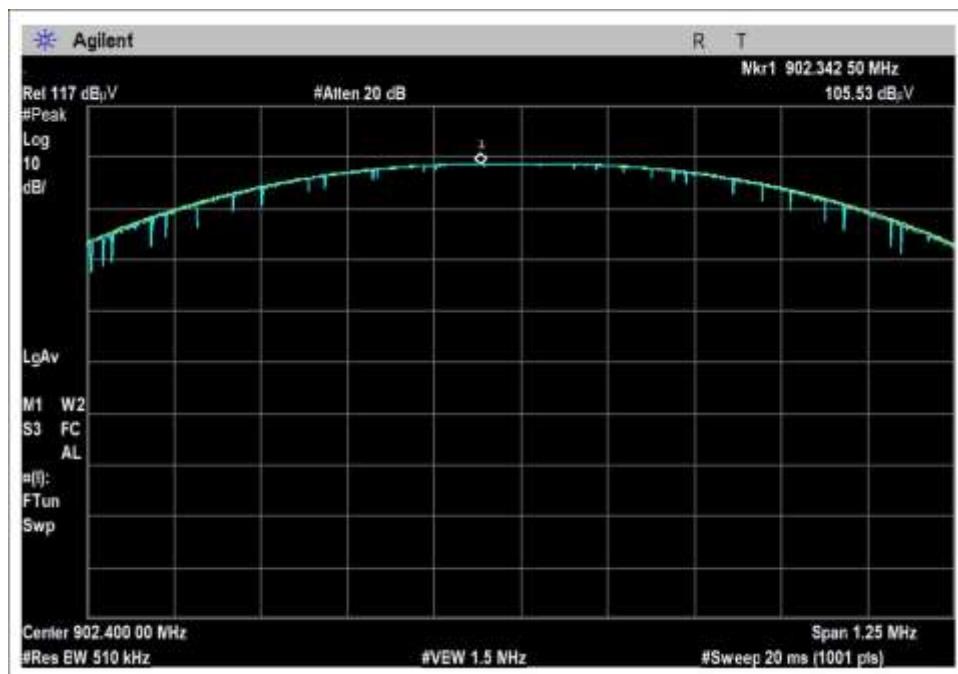
Parameter	Value
V <sub>Nominal</sub> :	3.3V
V <sub>Minimum</sub> :	2.8V
V <sub>Maximum</sub> :	3.8V

### Test Data Summary - RF Conducted Measurement

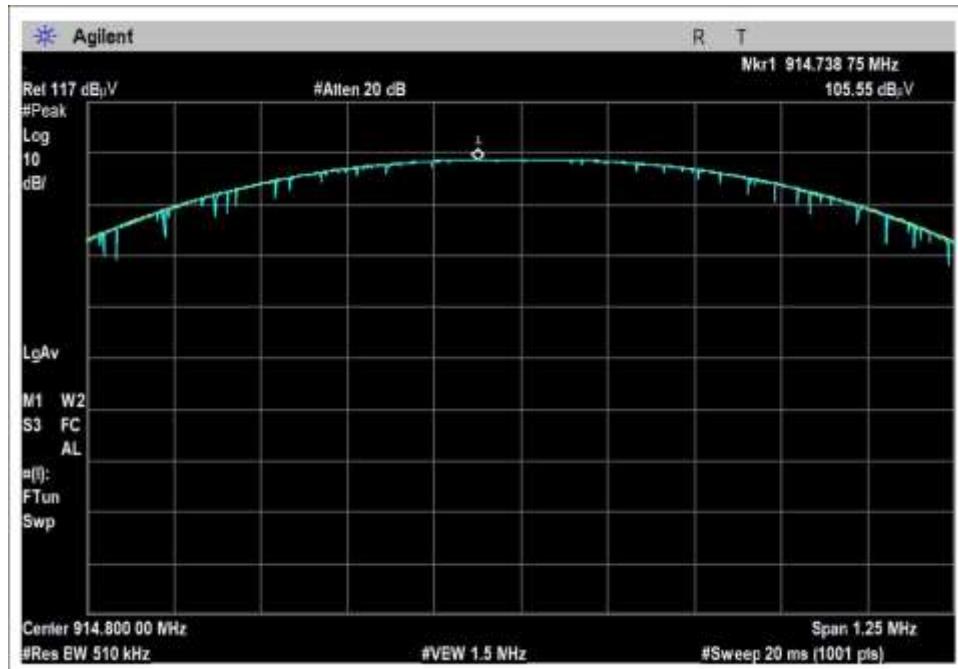
*Limit = {30dBm Conducted/36dBm EIRP | ≥ 50 Channels  
 24dBm Conducted/30dBm EIRP | < 50 Channels (min 25)}*

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
902.4	GFSK-2	Port 0, Swivel Type Dipole / 2.5dBi	19.0	≤30	Pass
914.8	GFSK-2	Port 0, Swivel Type Dipole / 2.5dBi	19.0	≤30	Pass
927.6	GFSK-2	Port 0, Swivel Type Dipole / 2.5dBi	19.0	≤30	Pass
902.4	GFSK-2	Port 1, Swivel Type Dipole / 2.5dBi	19.0	≤30	Pass
914.8	GFSK-2	Port 1, Swivel Type Dipole / 2.5dBi	19.0	≤30	Pass
927.6	GFSK-2	Port 1, Swivel Type Dipole / 2.5dBi	19.0	≤30	Pass

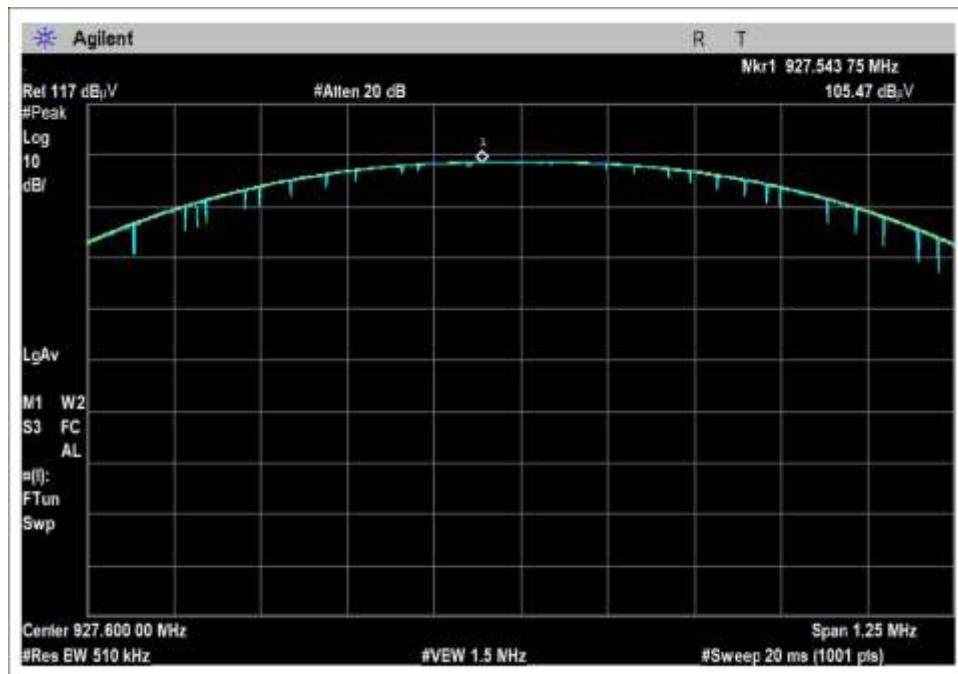
## Plots



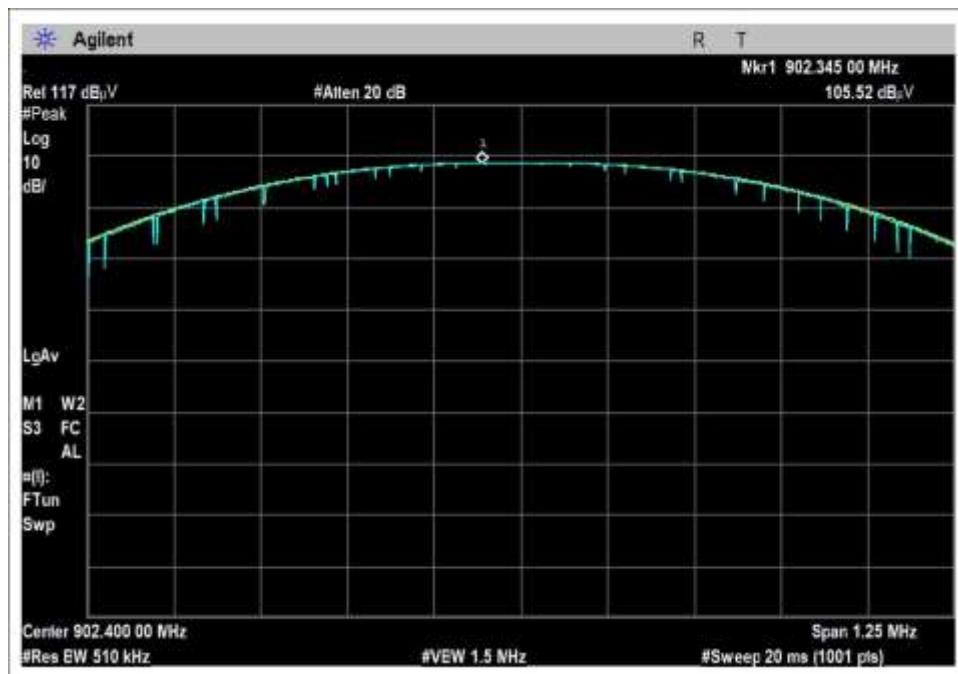
Low Channel, Antenna Port 0



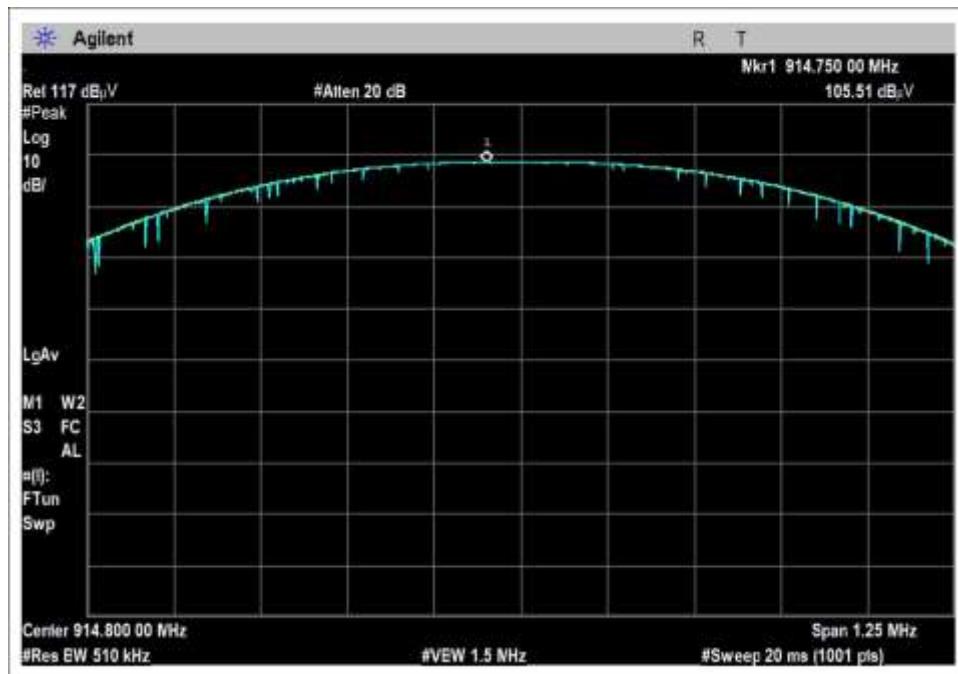
Middle Channel, Antenna Port 0



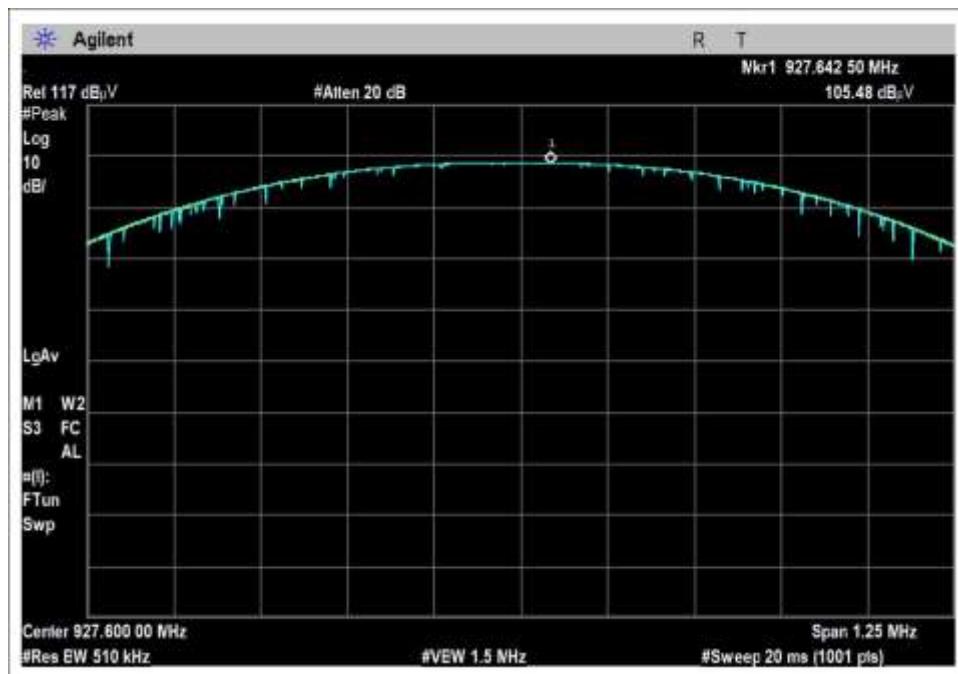
High Channel, Antenna Port 0



Low Channel, Antenna Port 1



Middle Channel, Antenna Port 1



High Channel, Antenna Port 1

## Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Nalloy, LLC**  
 Specification: **15.247(b) Power Output (902-928 MHz DTS)**  
 Work Order #: **104760** Date: 12/14/2020  
 Test Type: **Conducted Emissions** Time: 15:01:40  
 Tested By: M. Harrison/M. Atkinson Sequence#: 11  
 Software: EMITest 5.03.19 115VAC 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Test Environment Conditions:

Temperature: 20°C

Relative Humidity: 33%

Pressure: 102.1kPa

Test Method: ANSI C63.10 (2013)

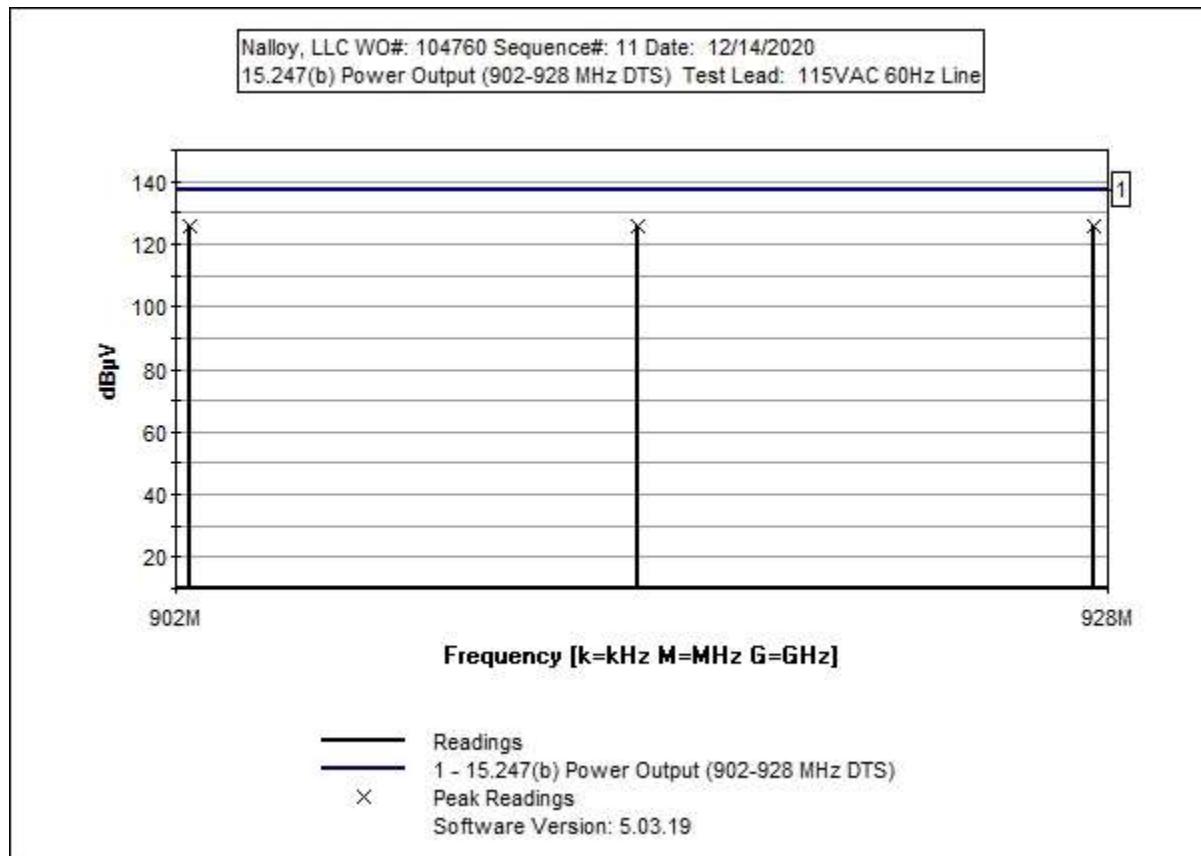
Frequency Range: Fundamental

Setup:

Continuously Transmitting

Antenna 0 and Antenna 1 ports measured

Channels measured: (0) 902.4 MHz, (31) 914.8MHz High (63) 927.6MHz


**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T2	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
T3	ANP05748	Attenuator	PE7004-20	3/4/2020	3/4/2022

**Measurement Data:** Reading listed by margin.

Test Lead: Line

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	927.600M	105.5	+0.0	+0.5	+20.0		+0.0	126.0	137.0	-11.0	Line ant1
2	914.800M	105.5	+0.0	+0.5	+20.0		+0.0	126.0	137.0	-11.0	Line ant1
3	902.400M	105.5	+0.0	+0.5	+20.0		+0.0	126.0	137.0	-11.0	Line ant1
4	927.600M	105.5	+0.0	+0.5	+20.0		+0.0	126.0	137.0	-11.0	Line ant0
5	914.800M	105.5	+0.0	+0.5	+20.0		+0.0	126.0	137.0	-11.0	Line ant0
6	902.400M	105.5	+0.0	+0.5	+20.0		+0.0	126.0	137.0	-11.0	Line ant0

## 15.247(d) RF Conducted Emissions & Band Edge

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Nalloy, LLC**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **104760** Date: 12/17/2020  
 Test Type: **Conducted Emissions** Time: 17:33:39  
 Tested By: M. Harrison/M. Atkinson Sequence#: 12  
 Software: EMITest 5.03.19 115VAC 60Hz

**Equipment Tested:**

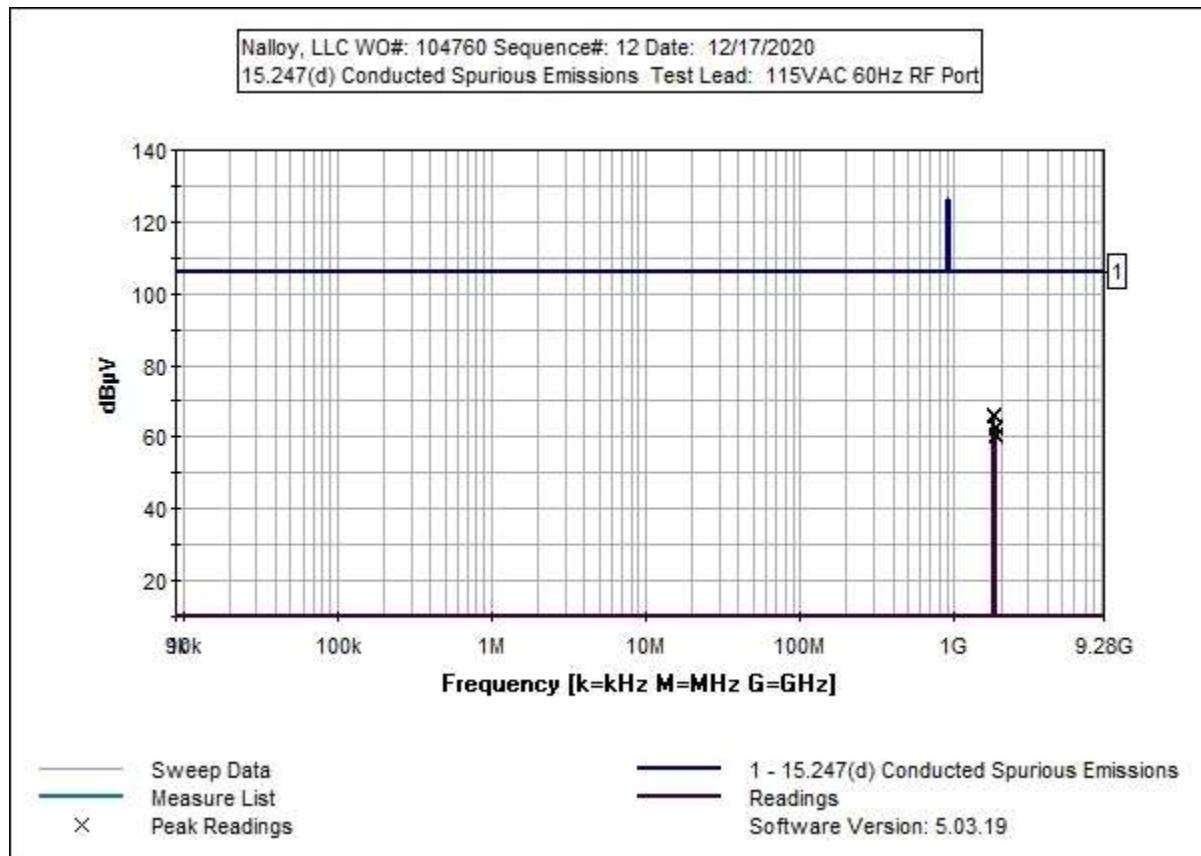
Device	Manufacturer	Model #	S/N
Configuration 1			

**Support Equipment:**

Device	Manufacturer	Model #	S/N
Configuration 1			

**Test Conditions / Notes:**

Test Environment Conditions:
Temperature: 20°C
Relative Humidity: 33%
Pressure: 102.1kPa
Test Method: ANSI C63.10 (2013)
Frequency Range: 9kHz-10GHz
Setup:
Continuously Transmitting
Antenna 0 and Antenna 1 ports measured
Channels measured: (0) 902.4 MHz, (31) 914.8MHz High (63) 927.6MHz


**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T1	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
T2	ANP05748	Attenuator	PE7004-20	3/4/2020	3/4/2022

**Measurement Data:** Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant	
1	1804.000M	45.8	+0.6	+20.0		+0.0	66.4	105.9	-39.5	Ant1 ant1
2	1804.000M	44.9	+0.6	+20.0		+0.0	65.5	105.9	-40.4	Ant0 ant0
3	1832.000M	42.2	+0.7	+20.0		+0.0	62.9	105.9	-43.0	Ant0 ant0
4	1832.000M	41.7	+0.7	+20.0		+0.0	62.4	105.9	-43.5	Ant1 ant1
5	1851.000M	39.9	+0.7	+20.0		+0.0	60.6	105.9	-45.3	Ant0 ant0
6	1851.000M	39.3	+0.7	+20.0		+0.0	60.0	105.9	-45.9	Ant1 ant1

## Band Edge

### Band Edge Summary

Limit applied: Max Power/100kHz - 20dB.

Operating Mode: Single Channel (Low and High)

Frequency (MHz)	Modulation	Measured (dB $\mu$ V)	Limit (dB $\mu$ V)	Results
902 (Ant Port 0)	GFSK-2	78.3	<105.9	Pass
928 (Ant Port 0)	GFSK-2	73.7	<105.9	Pass
902 (Ant Port 1)	GFSK-2	78.4	<105.9	Pass
928 (Ant Port 1)	GFSK-2	73.6	<105.9	Pass

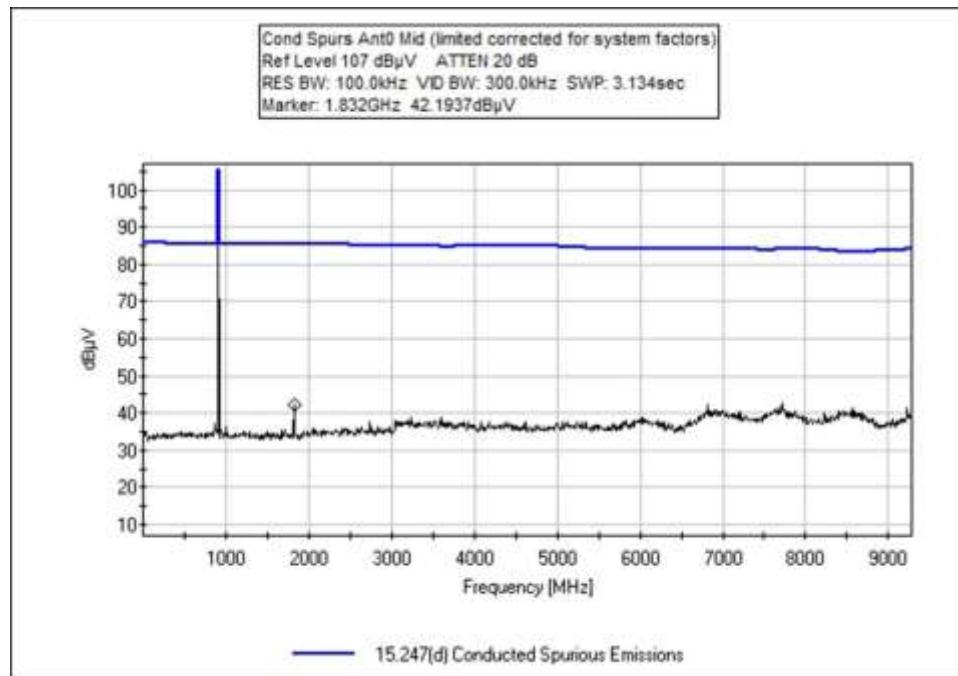
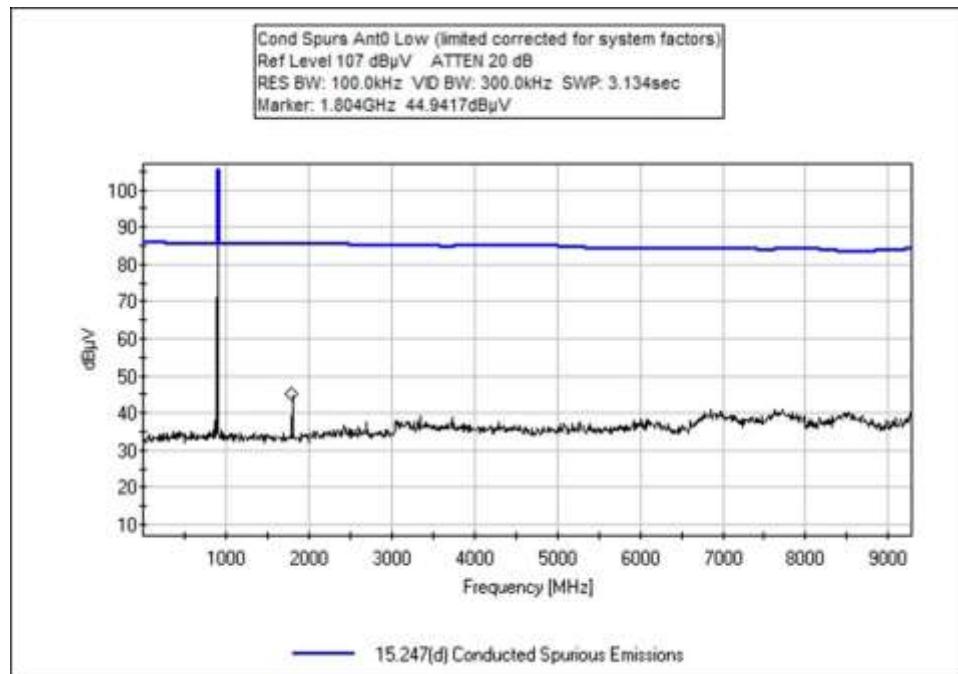
### Band Edge Summary

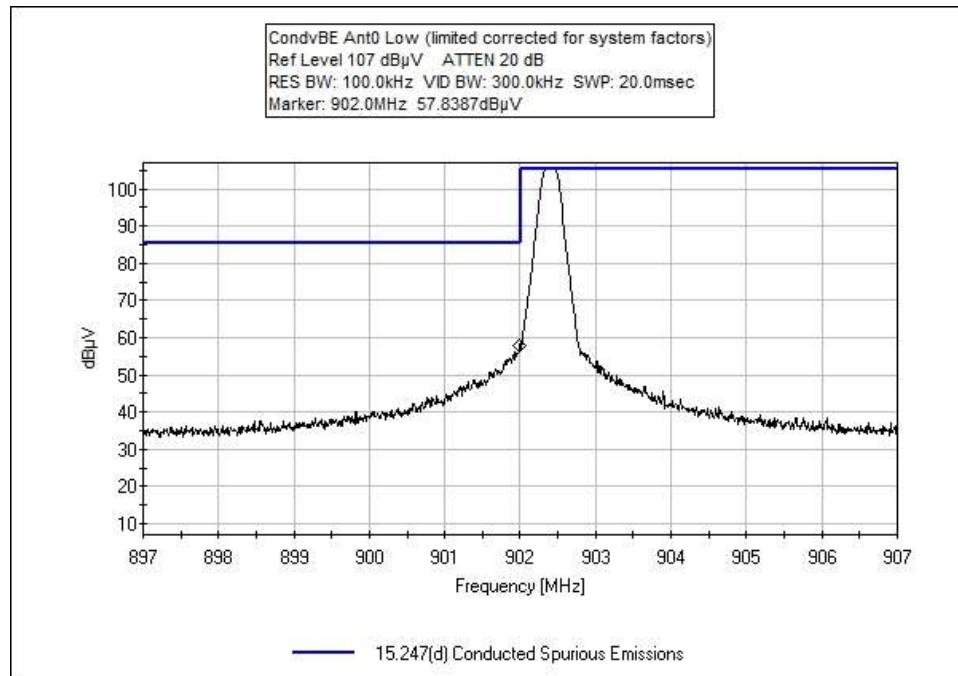
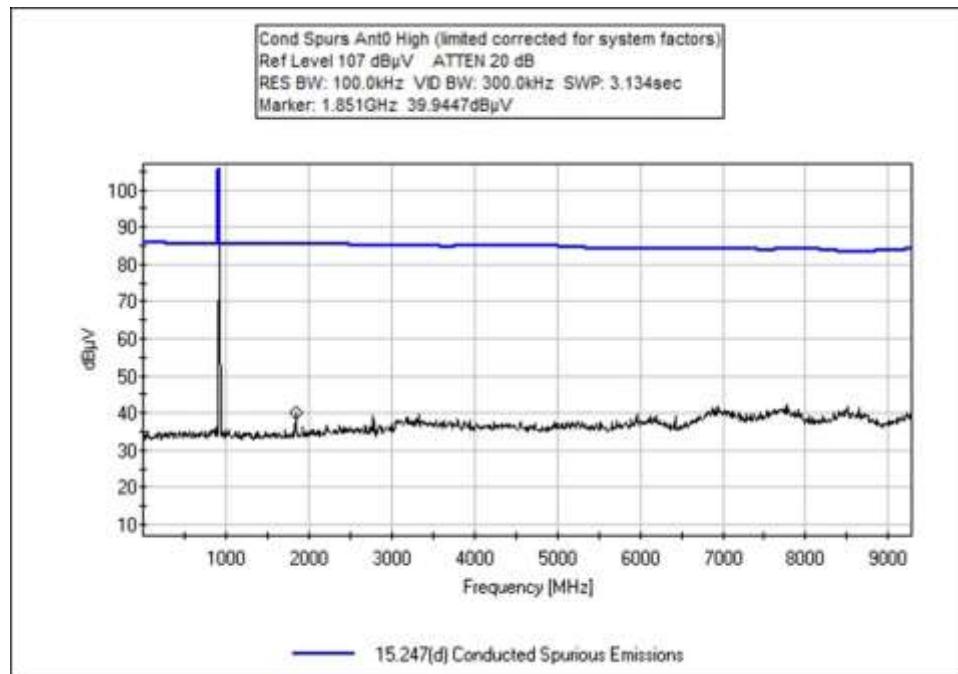
Limit applied: Max Power/100kHz - 20dB.

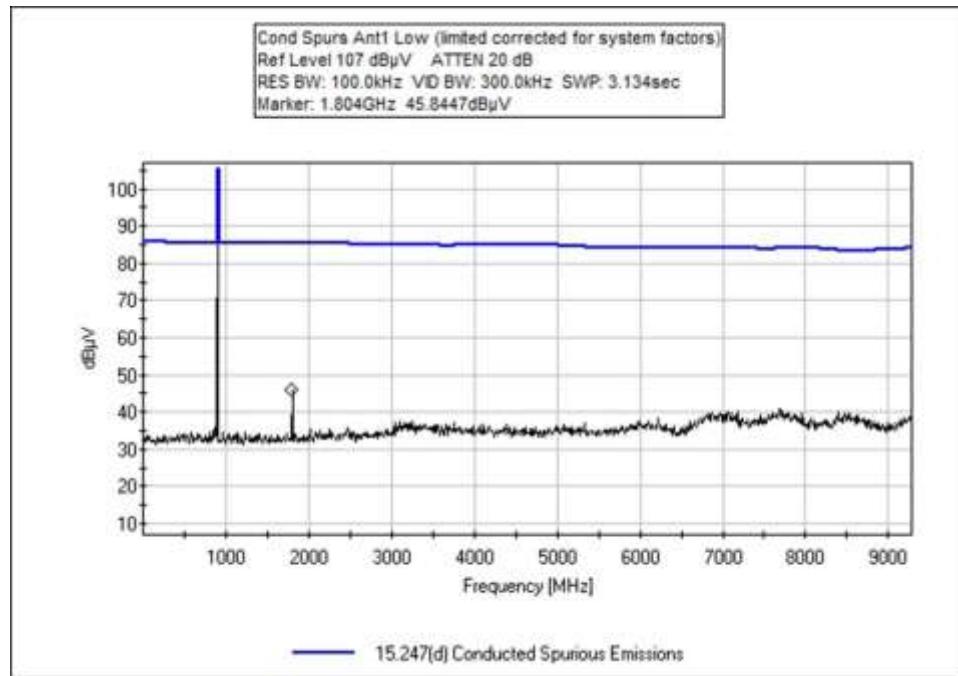
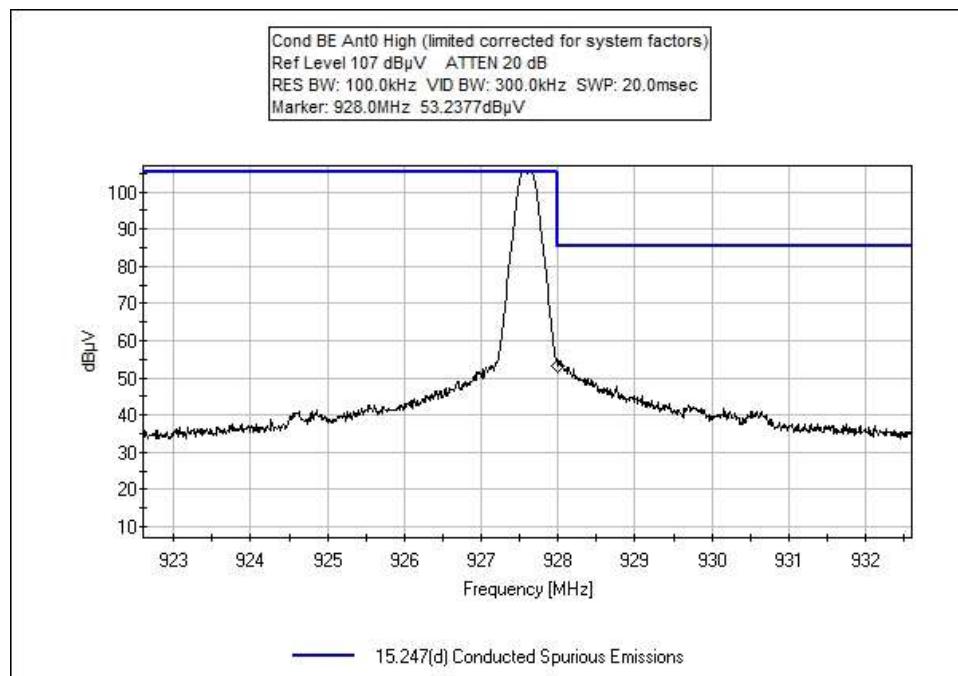
Operating Mode: Hopping

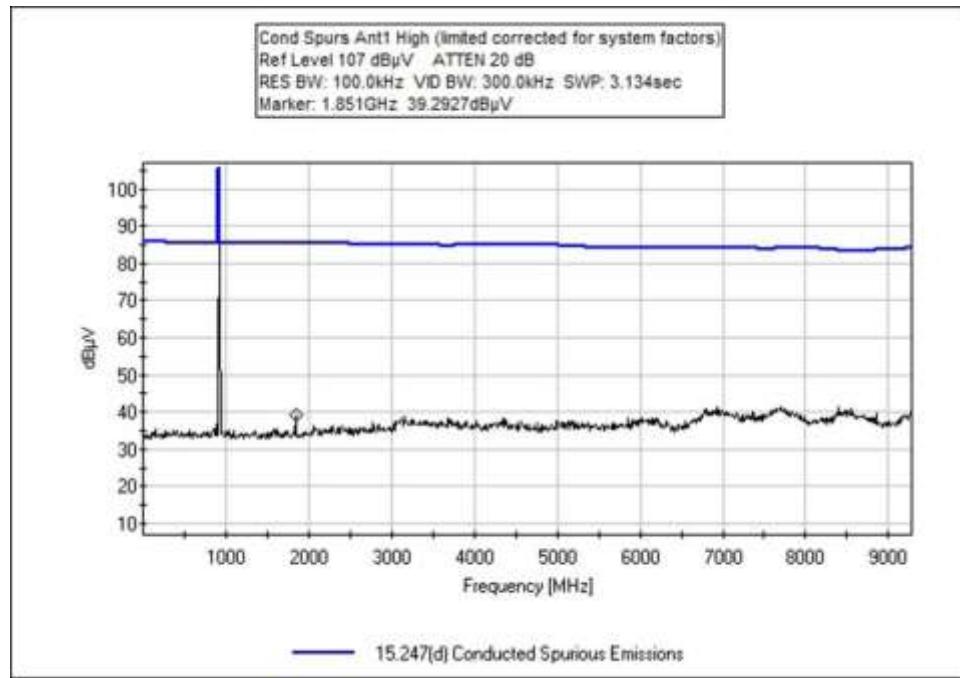
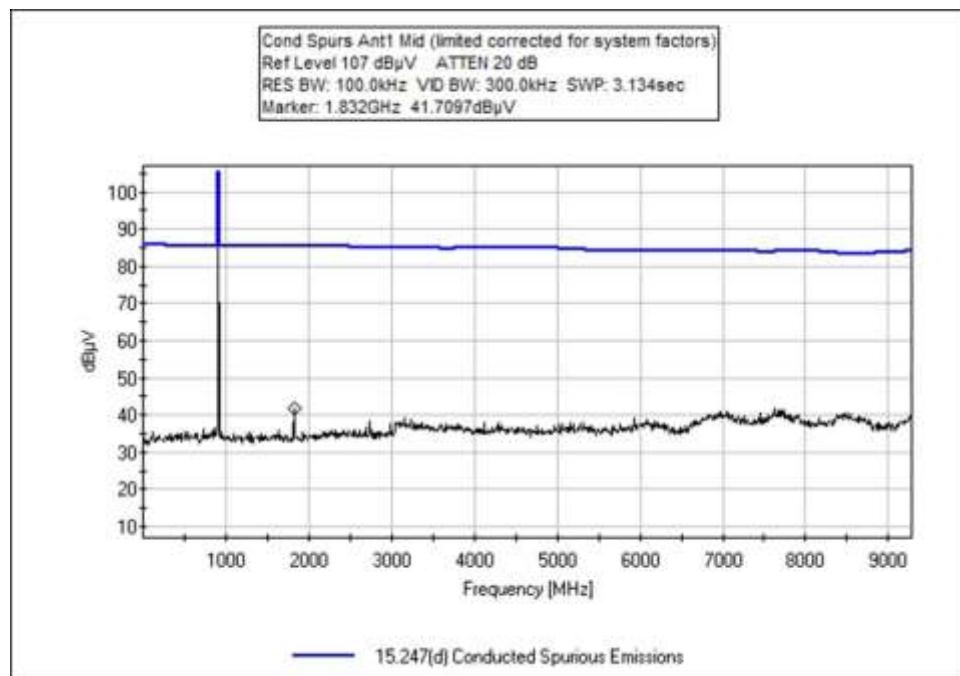
Frequency (MHz)	Modulation	Measured (dB $\mu$ V)	Limit (dB $\mu$ V)	Results
902 (Ant Port 0)	GFSK-2	81.6	<105.9	Pass
928 (Ant Port 0)	GFSK-2	75.9	<105.9	Pass
902 (Ant Port 1)	GFSK-2	73.1	<105.9	Pass
928 (Ant Port 1)	GFSK-2	82.2	<105.9	Pass

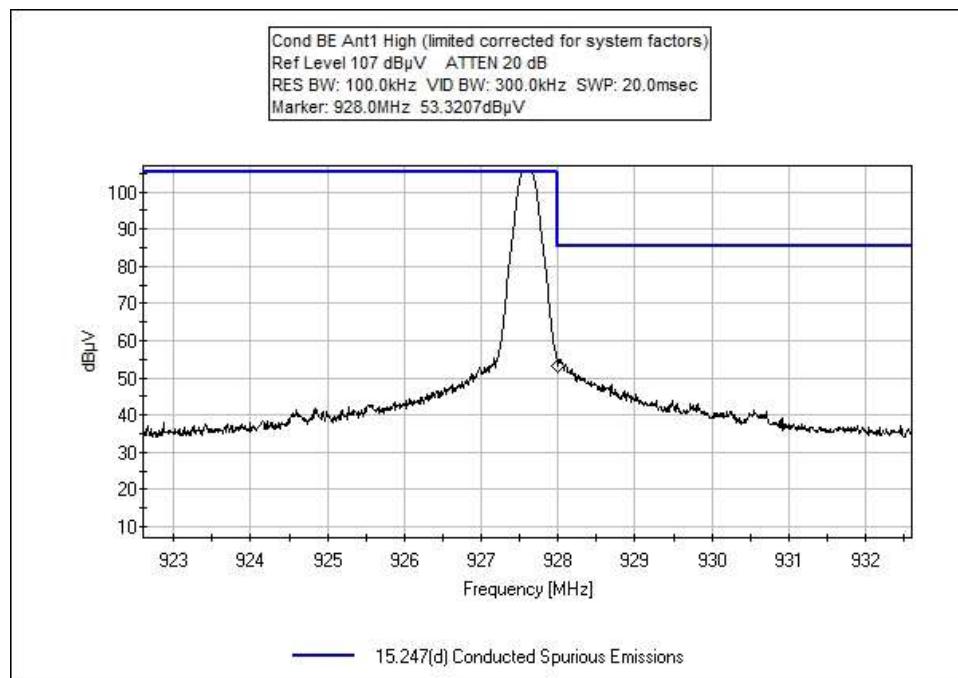
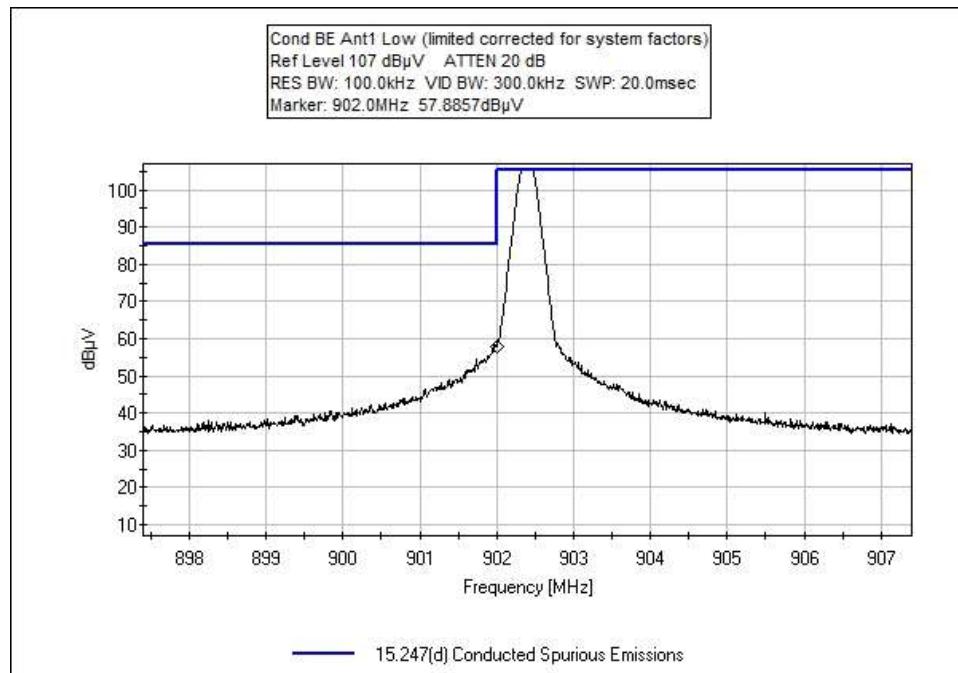
## Band Edge Plots

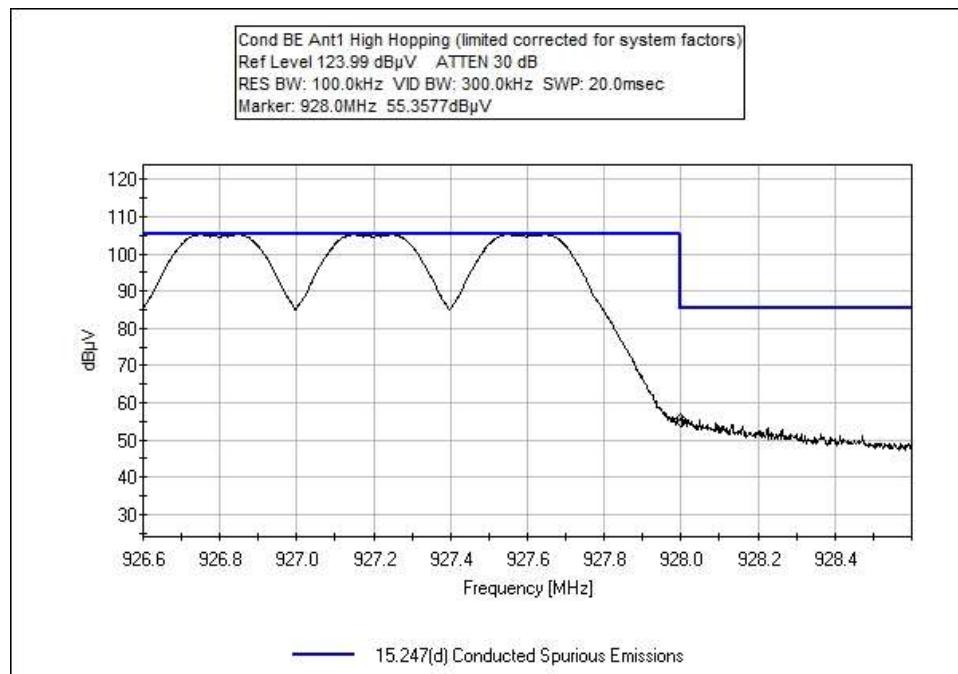
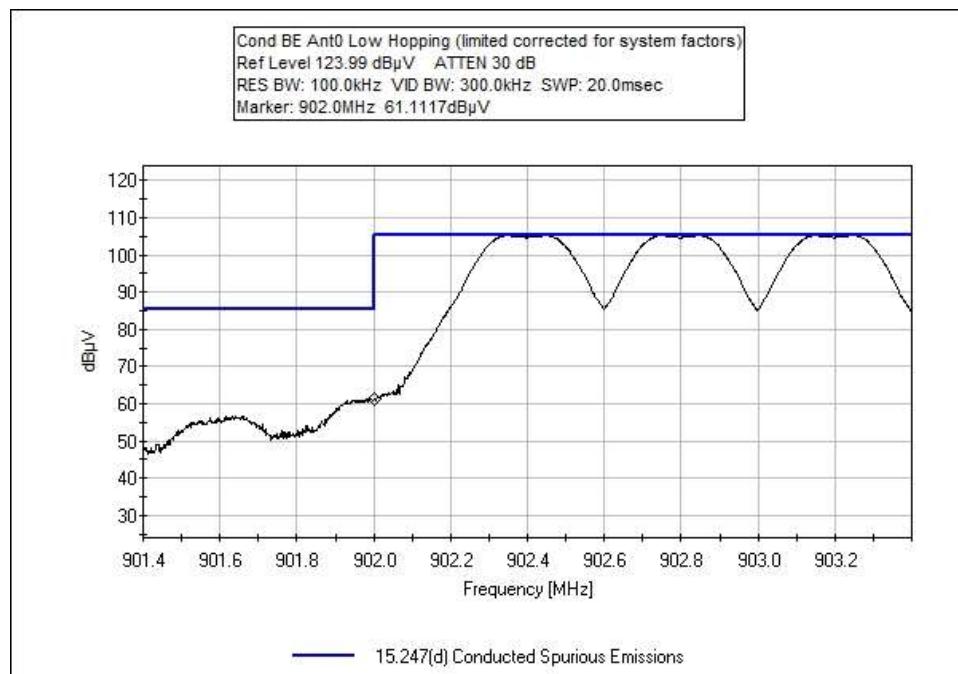


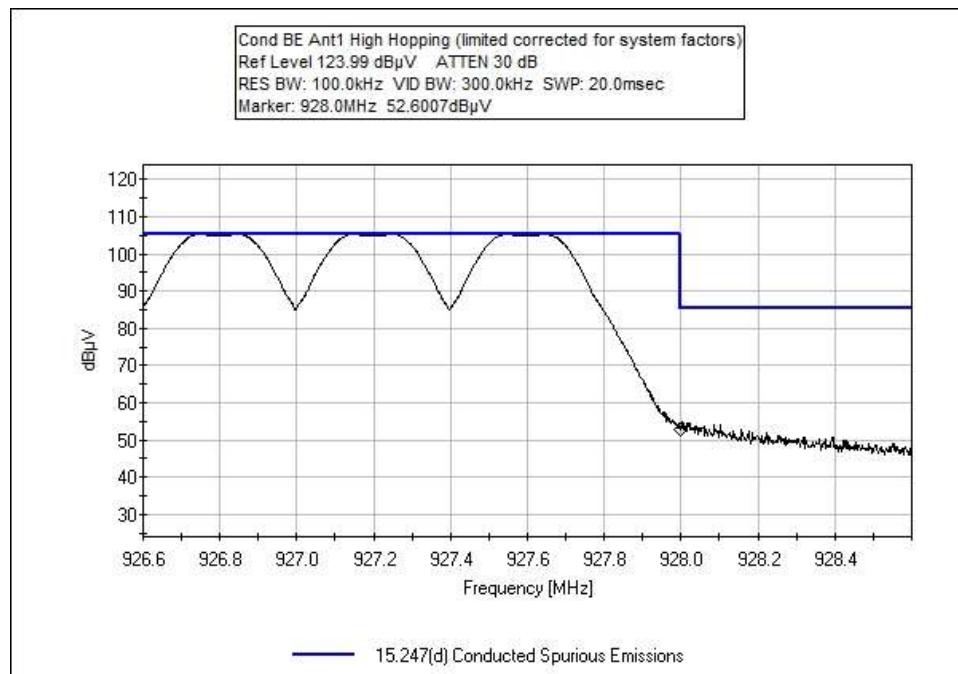
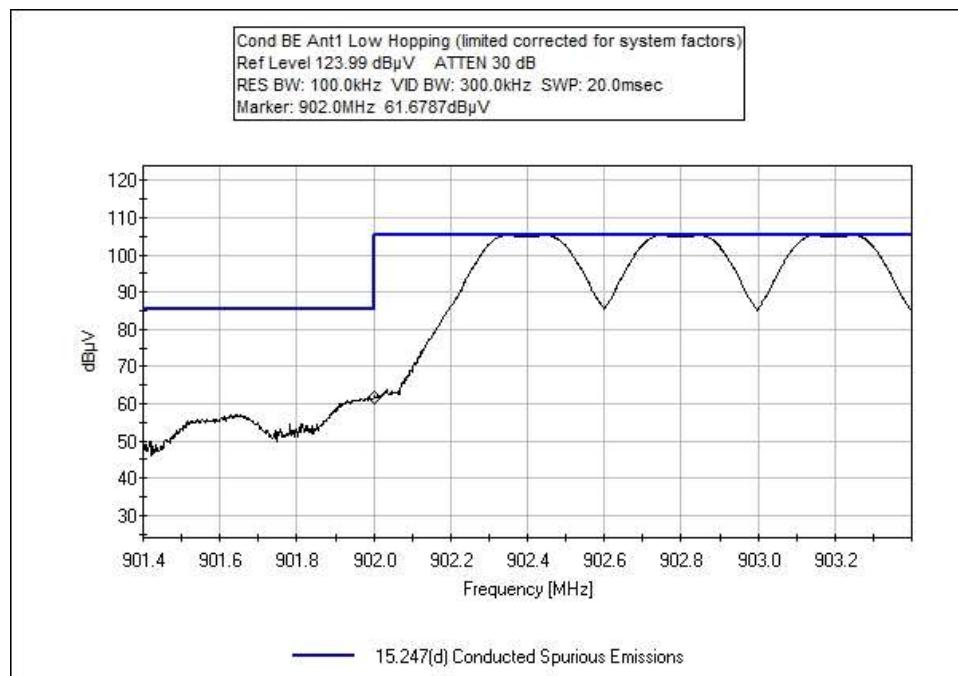












## Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Nalloy, LLC**  
 Specification: **15.247(d) Conducted Spurious Emissions**  
 Work Order #: **104760** Date: 12/17/2020  
 Test Type: **Conducted Emissions** Time: 17:33:39  
 Tested By: M. Harrison/M. Atkinson Sequence#: 12  
 Software: EMITest 5.03.19 115VAC 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Test Environment Conditions:
Temperature: 20°C
Relative Humidity: 33%
Pressure: 102.1kPa
Test Method: ANSI C63.10 (2013)
Frequency Range: 9kHz-10GHz
Setup:
Continuously Transmitting
Antenna 0 and Antenna 1 ports measured
Channels measured: (0) 902.4 MHz, (31) 914.8MHz High (63) 927.6MHz

***Test Equipment:***

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T1	ANP06007	Cable	Heliax	1/20/2020	1/20/2022
T2	ANP05748	Attenuator	PE7004-20	3/4/2020	3/4/2022

Measurement Data:				Reading listed by margin.		Test Lead: RF Port				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T2 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant
1	902.000M	61.7	+0.5	+20.0		+0.0	82.2	105.9	-23.7	RF Po ant1 hop
2	902.000M	61.1	+0.5	+20.0		+0.0	81.6	105.9	-24.3	RF Po ant0 hop
3	902.000M	57.9	+0.5	+20.0		+0.0	78.4	105.9	-27.5	Ant1 ant1
4	902.000M	57.8	+0.5	+20.0		+0.0	78.3	105.9	-27.6	Ant0 ant0
5	928.000M	55.4	+0.5	+20.0		+0.0	75.9	105.9	-30.0	RF Po ant0 hop
6	928.000M	53.2	+0.5	+20.0		+0.0	73.7	105.9	-32.2	Ant0 ant0
7	928.000M	53.1	+0.5	+20.0		+0.0	73.6	105.9	-32.3	Ant1 ant1
8	928.000M	52.6	+0.5	+20.0		+0.0	73.1	105.9	-32.8	RF Po ant1 hop

## 15.247(d) Radiated Emissions & Band Edge

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
 Customer: **Nalloy, LLC**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **104760** Date: 12/11/2020  
 Test Type: **Maximized Emissions** Time: 12:09:14  
 Tested By: M. Harrison/M. Atkinson Sequence#: 4  
 Software: EMITest 5.03.19

#### *Equipment Tested:*

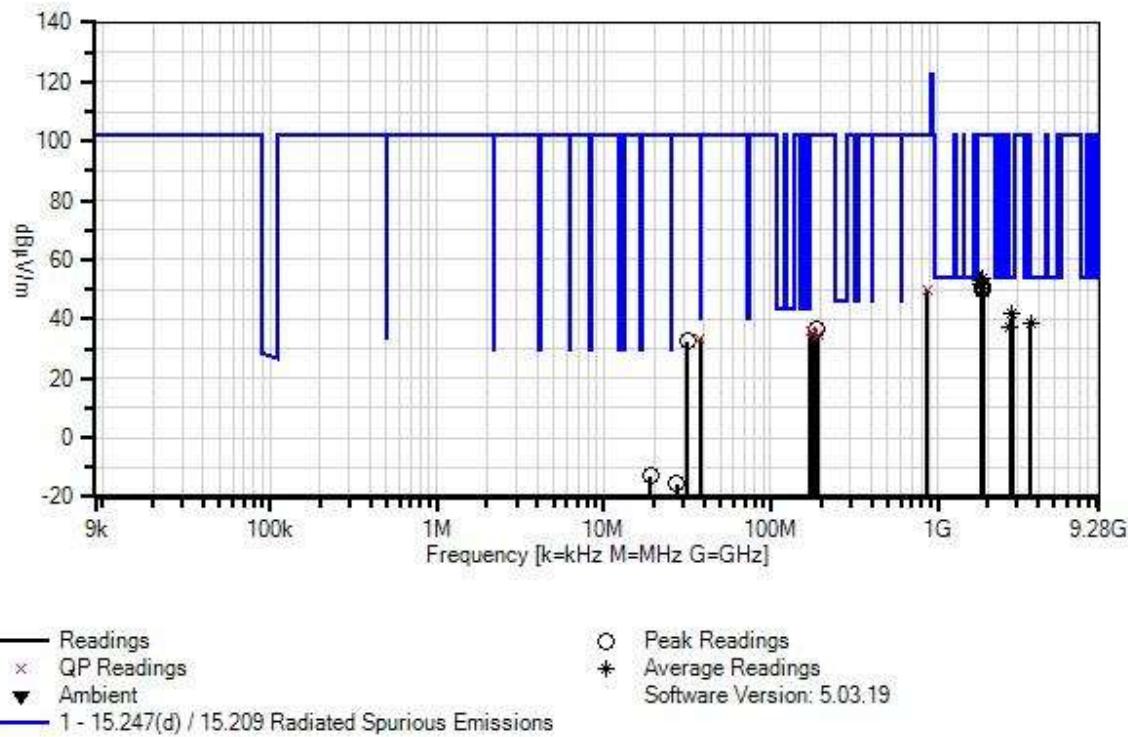
Device	Manufacturer	Model #	S/N
Configuration 1			

#### *Support Equipment:*

Device	Manufacturer	Model #	S/N
Configuration 1			

#### *Test Conditions / Notes:*

Test Environment Conditions:
Temperature: 20°C
Relative Humidity: 33%
Pressure: 102.1kPa
Test Method: ANSI C63.10 (2013)
Frequency Range: 9kHz-10GHz
Setup:
SBS Module
Antenna 0
Low Channel (0) 902.4 MHz, Mid (31) 914.8MHz, High (63) 927.6MHz
GFSK-2
100% Duty Cycle
PWR Level Setting: 200
PWR Output: 20dBm
POE powered

Nalloy, LLC WO#: 104760 Sequence#: 4 Date: 12/11/2020  
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Various

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T2	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T3	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T5	ANP06243	Attenuator	54A-10	1/27/2020	1/27/2022
T6	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T7	ANP07505	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021
T8	AN03170	High Pass Filter	HM1155-11SS	10/23/2019	10/23/2021
T9	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T10	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T11	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T12	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T13	ANP05360	Cable	RG214	2/3/2020	2/3/2022

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
			T9	T10	T11	T12					
			T13								
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	37.550M	13.8	+0.0	+0.1	+0.0	+0.0	+0.0	33.5	40.0	-6.5	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.2	+5.8	+0.3					
			+0.3								
^	37.550M	19.5	+0.0	+0.1	+0.0	+0.0	+0.0	39.2	40.0	-0.8	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.2	+5.8	+0.3					
			+0.3								
3	172.135M	18.4	+0.0	+0.2	+0.0	+0.0	+0.0	35.7	43.5	-7.8	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.9	+5.8	+0.6					
			+0.8								
^	172.135M	21.5	+0.0	+0.2	+0.0	+0.0	+0.0	38.8	43.5	-4.7	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.9	+5.8	+0.6					
			+0.8								
5	2782.770M	33.3	+0.0	+0.7	-34.1	+28.5	+0.0	42.0	54.0	-12.0	Vert
	Ave		+10.0	+2.9	+0.3	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	2782.770M	41.9	+0.0	+0.7	+0.0	+0.0	+0.0	51.1	54.0	-2.9	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+5.9	+2.6					
			+0.0								
7	3609.491M	26.9	+0.0	+0.8	-33.8	+30.3	+0.0	38.4	54.0	-15.6	Vert
	Ave		+9.8	+3.4	+0.5	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	3609.530M	38.9	+0.0	+0.8	-33.8	+30.3	+0.0	50.4	54.0	-3.6	Vert
			+9.8	+3.4	+0.5	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
9	2707.298M	28.5	+0.0	+0.7	-34.1	+28.3	+0.0	37.0	54.0	-17.0	Vert
	Ave		+10.0	+2.9	+0.3	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	2707.390M	41.4	+0.0	+0.7	-34.1	+28.3	+0.0	49.9	54.0	-4.1	Vert
			+10.0	+2.9	+0.3	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

11	1829.630M	48.8	+0.0	+0.5	-34.8	+26.3	+0.0	53.8	102.4	-48.6	Horiz
	Ave		+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1829.590M	52.3	+0.0	+0.5	-34.8	+26.3	+0.0	57.3	102.4	-45.1	Horiz
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1829.610M	47.5	+0.0	+0.5	-34.8	+26.3	+0.0	52.5	102.4	-49.9	Horiz
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
14	1804.884M	48.5	+0.0	+0.5	-34.8	+26.1	+0.0	53.3	102.4	-49.1	Horiz
	Ave		+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
15	1804.760M	47.1	+0.0	+0.5	-34.8	+26.1	+0.0	51.9	102.4	-50.5	Horiz
	Ave		+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1804.842M	54.1	+0.0	+0.5	-34.8	+26.1	+0.0	58.9	102.4	-43.5	Horiz
			+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1804.760M	49.8	+0.0	+0.5	-34.8	+26.1	+0.0	54.6	102.4	-47.8	Horiz
			+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
18	1804.892M	46.7	+0.0	+0.5	-34.8	+26.1	+0.0	51.5	102.4	-50.9	Vert
	Ave		+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1804.820M	47.8	+0.0	+0.5	-34.8	+26.1	+0.0	52.6	102.4	-49.8	Vert
			+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
20	1855.170M	46.0	+0.0	+0.5	-34.7	+26.5	+0.0	51.3	102.4	-51.1	Vert
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
21	1829.600M	45.3	+0.0	+0.5	-34.8	+26.3	+0.0	50.3	102.4	-52.1	Vert
	Ave		+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1829.640M	49.4	+0.0	+0.5	-34.8	+26.3	+0.0	54.4	102.4	-48.0	Vert
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
23	1855.230M	44.9	+0.0	+0.5	-34.7	+26.5	+0.0	50.2	102.4	-52.2	Horiz
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

24	1855.310M	44.8	+0.0	+0.5	-34.7	+26.6	+0.0	50.2	102.4	-52.2	Vert
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
25	1855.230M	44.8	+0.0	+0.5	-34.7	+26.5	+0.0	50.1	102.4	-52.3	Vert
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
26	864.050M	16.6	+0.0	+0.3	+0.0	+0.0	+0.0	49.9	102.4	-52.5	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+23.8	+5.8	+1.4					
			+2.0								
^	864.050M	20.3	+0.0	+0.3	+0.0	+0.0	+0.0	53.6	102.4	-48.8	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+23.8	+5.8	+1.4					
			+2.0								
28	188.100M	19.3	+0.0	+0.2	+0.0	+0.0	+0.0	36.7	102.4	-65.7	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.9	+5.8	+0.7					
			+0.8								
29	179.815M	18.0	+0.0	+0.2	+0.0	+0.0	+0.0	35.4	102.4	-67.0	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+10.0	+5.8	+0.6					
			+0.8								
^	179.815M	21.4	+0.0	+0.2	+0.0	+0.0	+0.0	38.8	102.4	-63.6	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+10.0	+5.8	+0.6					
			+0.8								
31	192.550M	17.3	+0.0	+0.2	+0.0	+0.0	+0.0	34.7	102.4	-67.7	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.9	+5.8	+0.7					
			+0.8								
^	192.550M	21.1	+0.0	+0.2	+0.0	+0.0	+0.0	38.5	102.4	-63.9	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.9	+5.8	+0.7					
			+0.8								
33	31.580M	9.9	+0.0	+0.1	+0.0	+0.0	+0.0	32.3	102.4	-70.1	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+15.9	+5.8	+0.3					
			+0.3								
34	19.052M	19.2	+0.0	+0.1	+0.0	+0.0	-40.0	-12.9	102.4	-115.3	Horiz
			+0.0	+0.2	+0.0	+0.0					
			+7.6	+0.0	+0.0	+0.0					
			+0.0								
35	27.424M	18.9	+0.0	+0.1	+0.0	+0.0	-40.0	-15.4	102.4	-117.8	Horiz
			+0.0	+0.3	+0.0	+0.0					
			+5.3	+0.0	+0.0	+0.0					
			+0.0								



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
Customer: **Nalloy, LLC**  
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
Work Order #: **103037** Date: 12/11/2020  
Test Type: **Maximized Emissions** Time: 12:05:06  
Tested By: M. Harrison/M. Atkinson Sequence#: 5  
Software: EMITest 5.03.19

***Equipment Tested:***

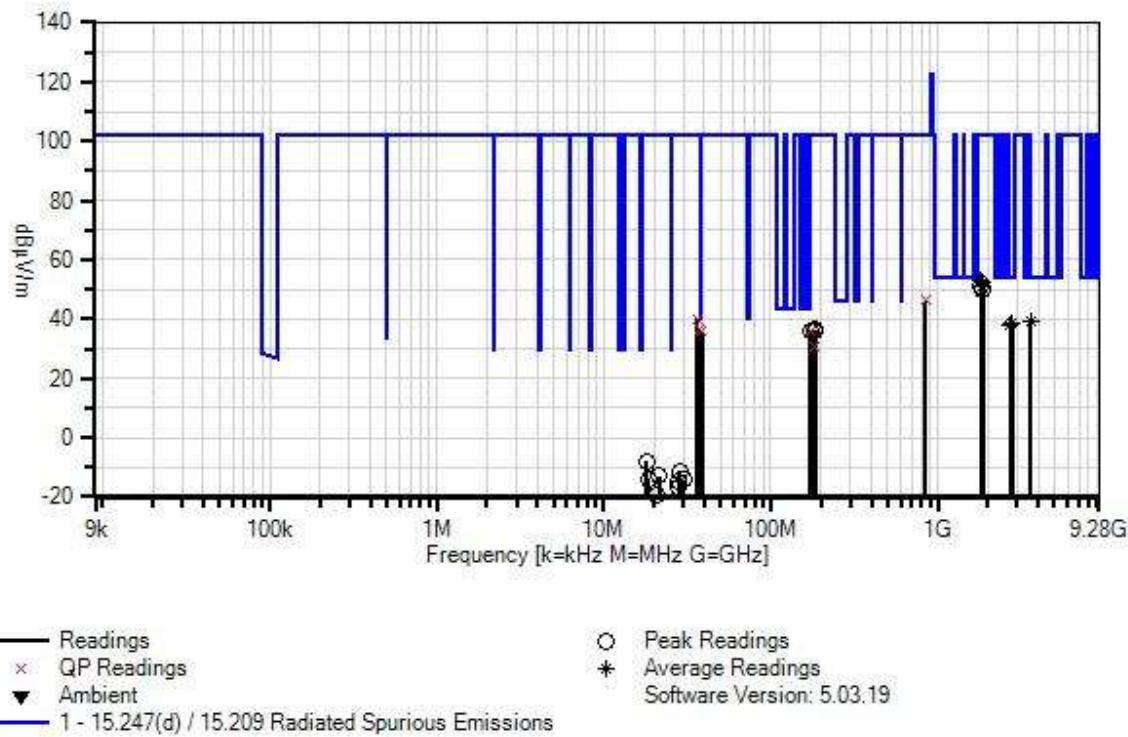
Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Test Environment Conditions: Temperature: 20°C Relative Humidity: 33% Pressure: 102.1kPa
Test Method: ANSI C63.10 (2013)
Frequency Range: 9kHz to 10GHz
Setup: SBS Antenna 1 Low Channel (0) 902.4 MHz, Mid (31) 914.8MHz, High (63) 927.6MHz GFSK-2 100% Duty Cycle PWR Level Setting: 200 PWR Output: 20dBm POE powered

Nalloy, LLC WO#: 103037 Sequence#: 5 Date: 12/11/2020  
 15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Various

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T2	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T3	AN03540	Preamp	83017A	5/13/2019	5/13/2021
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/5/2019	7/5/2021
T5	ANP06243	Attenuator	54A-10	1/27/2020	1/27/2022
T6	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T7	ANP07505	Cable	CLU40-KMKM-02.00F	1/17/2019	1/17/2021
T8	AN03170	High Pass Filter	HM1155-11SS	10/23/2019	10/23/2021
T9	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022
T10	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T11	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T12	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T13	ANP05360	Cable	RG214	2/3/2020	2/3/2022

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
			T9	T10	T11	T12					
			T13								
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	37.573M	16.8	+0.0	+0.1	+0.0	+0.0	+0.0	36.5	40.0	-3.5	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.2	+5.8	+0.3					
			+0.3								
^	37.573M	19.6	+0.0	+0.1	+0.0	+0.0	+0.0	39.3	40.0	-0.7	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.2	+5.8	+0.3					
			+0.3								
3	172.592M	19.0	+0.0	+0.2	+0.0	+0.0	+0.0	36.2	43.5	-7.3	Horiz
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.8	+5.8	+0.6					
			+0.8								
^	172.592M	21.6	+0.0	+0.2	+0.0	+0.0	+0.0	38.8	43.5	-4.7	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.8	+5.8	+0.6					
			+0.8								
5	3609.650M	27.7	+0.0	+0.8	-33.8	+30.3	+0.0	39.2	54.0	-14.8	Horiz
	Ave		+9.8	+3.4	+0.5	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	3609.630M	38.2	+0.0	+0.8	-33.8	+30.3	+0.0	49.7	54.0	-4.3	Horiz
			+9.8	+3.4	+0.5	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	3609.650M	37.6	+0.0	+0.8	-33.8	+30.3	+0.0	49.1	54.0	-4.9	Horiz
			+9.8	+3.4	+0.5	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
8	2782.760M	29.9	+0.0	+0.7	-34.1	+28.5	+0.0	38.6	54.0	-15.4	Horiz
	Ave		+10.0	+2.9	+0.3	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	2782.760M	39.7	+0.0	+0.7	+0.0	+0.0	+0.0	48.9	54.0	-5.1	Horiz
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+5.9	+2.6					
			+0.0								
10	2707.450M	29.7	+0.0	+0.7	-34.1	+28.3	+0.0	38.2	54.0	-15.8	Horiz
	Ave		+10.0	+2.9	+0.3	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	2707.450M	42.4	+0.0	+0.7	-34.1	+28.3	+0.0	50.9	54.0	-3.1	Horiz
			+10.0	+2.9	+0.3	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								

12	1804.900M	48.0	+0.0	+0.5	-34.8	+26.1	+0.0	52.8	102.4	-49.6	Horiz
	Ave		+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1804.900M	51.7	+0.0	+0.5	-34.8	+26.1	+0.0	56.5	102.4	-45.9	Horiz
			+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
14	1829.550M	47.5	+0.0	+0.5	-34.8	+26.3	+0.0	52.5	102.4	-49.9	Horiz
	Ave		+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1829.550M	51.0	+0.0	+0.5	-34.8	+26.3	+0.0	56.0	102.4	-46.4	Horiz
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
16	1855.358M	46.0	+0.0	+0.5	-34.7	+26.6	+0.0	51.4	102.4	-51.0	Horiz
	Ave		+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
^	1855.340M	50.5	+0.0	+0.5	-34.7	+26.6	+0.0	55.9	102.4	-46.5	Horiz
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
18	1804.850M	46.5	+0.0	+0.5	-34.8	+26.1	+0.0	51.3	102.4	-51.1	Vert
			+10.0	+2.3	+0.2	+0.5					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
19	1855.180M	44.4	+0.0	+0.5	-34.7	+26.5	+0.0	49.7	102.4	-52.7	Vert
			+10.0	+2.4	+0.2	+0.4					
			+0.0	+0.0	+0.0	+0.0					
			+0.0								
20	838.000M	13.0	+0.0	+0.3	+0.0	+0.0	+0.0	46.2	102.4	-56.2	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+23.7	+5.8	+1.4					
			+2.0								
^	838.000M	18.0	+0.0	+0.3	+0.0	+0.0	+0.0	51.2	102.4	-51.2	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+23.7	+5.8	+1.4					
			+2.0								
22	36.049M	19.7	+0.0	+0.1	+0.0	+0.0	+0.0	40.0	102.4	-62.4	Vert
	QP		+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.8	+5.8	+0.3					
			+0.3								
^	36.049M	21.7	+0.0	+0.1	+0.0	+0.0	+0.0	42.0	102.4	-60.4	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.8	+5.8	+0.3					
			+0.3								
24	183.300M	19.1	+0.0	+0.2	+0.0	+0.0	+0.0	36.5	102.4	-65.9	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+10.0	+5.8	+0.6					
			+0.8								

25	183.781M	18.9	+0.0	+0.2	+0.0	+0.0	+0.0	36.3	102.4	-66.1	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+10.0	+5.8	+0.6					
			+0.8								
26	174.500M	18.9	+0.0	+0.2	+0.0	+0.0	+0.0	36.1	102.4	-66.3	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.8	+5.8	+0.6					
			+0.8								
27	38.569M	16.6	+0.0	+0.1	+0.0	+0.0	+0.0	35.9	102.4	-66.5	Vert
QP			+0.0	+0.0	+0.0	+0.0					
			+0.0	+12.8	+5.8	+0.3					
			+0.3								
^	38.569M	19.5	+0.0	+0.1	+0.0	+0.0	+0.0	38.8	102.4	-63.6	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+12.8	+5.8	+0.3					
			+0.3								
29	182.733M	13.0	+0.0	+0.2	+0.0	+0.0	+0.0	30.4	102.4	-72.0	Vert
QP			+0.0	+0.0	+0.0	+0.0					
			+0.0	+10.0	+5.8	+0.6					
			+0.8								
^	182.733M	17.8	+0.0	+0.2	+0.0	+0.0	+0.0	35.2	102.4	-67.2	Vert
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+10.0	+5.8	+0.6					
			+0.8								
31	18.010M	23.7	+0.0	+0.1	+0.0	+0.0	-40.0	-8.0	102.4	-110.4	Ground
			+0.0	+0.2	+0.0	+0.0					
			+8.0	+0.0	+0.0	+0.0					
			+0.0								
32	28.291M	23.3	+0.0	+0.1	+0.0	+0.0	-40.0	-11.4	102.4	-113.8	Para
			+0.0	+0.3	+0.0	+0.0					
			+4.9	+0.0	+0.0	+0.0					
			+0.0								
33	21.568M	19.8	+0.0	+0.1	+0.0	+0.0	-40.0	-12.9	102.4	-115.3	Perp
			+0.0	+0.2	+0.0	+0.0					
			+7.0	+0.0	+0.0	+0.0					
			+0.0								
34	18.543M	17.9	+0.0	+0.1	+0.0	+0.0	-40.0	-14.0	102.4	-116.4	Para
			+0.0	+0.2	+0.0	+0.0					
			+7.8	+0.0	+0.0	+0.0					
			+0.0								
35	30.000M	21.0	+0.0	+0.1	+0.0	+0.0	-40.0	-14.4	102.4	-116.8	Para
			+0.0	+0.3	+0.0	+0.0					
			+4.2	+0.0	+0.0	+0.0					
			+0.0								

36	28.176M	19.7	+0.0	+0.1	+0.0	+0.0	-40.0	-14.9	102.4	-117.3	Perp
			+0.0	+0.3	+0.0	+0.0					
			+5.0	+0.0	+0.0	+0.0					
			+0.0								
37	28.171M	17.8	+0.0	+0.1	+0.0	+0.0	-40.0	-16.8	102.4	-119.2	Para
			+0.0	+0.3	+0.0	+0.0					
			+5.0	+0.0	+0.0	+0.0					
			+0.0								
38	20.583M	13.1	+0.0	+0.1	+0.0	+0.0	-40.0	-19.4	102.4	-121.8	Para
			+0.0	+0.2	+0.0	+0.0					
			+7.2	+0.0	+0.0	+0.0					
			+0.0								

## Band Edge

### Band Edge Summary

Operating Mode: Single Channel (Low and High)

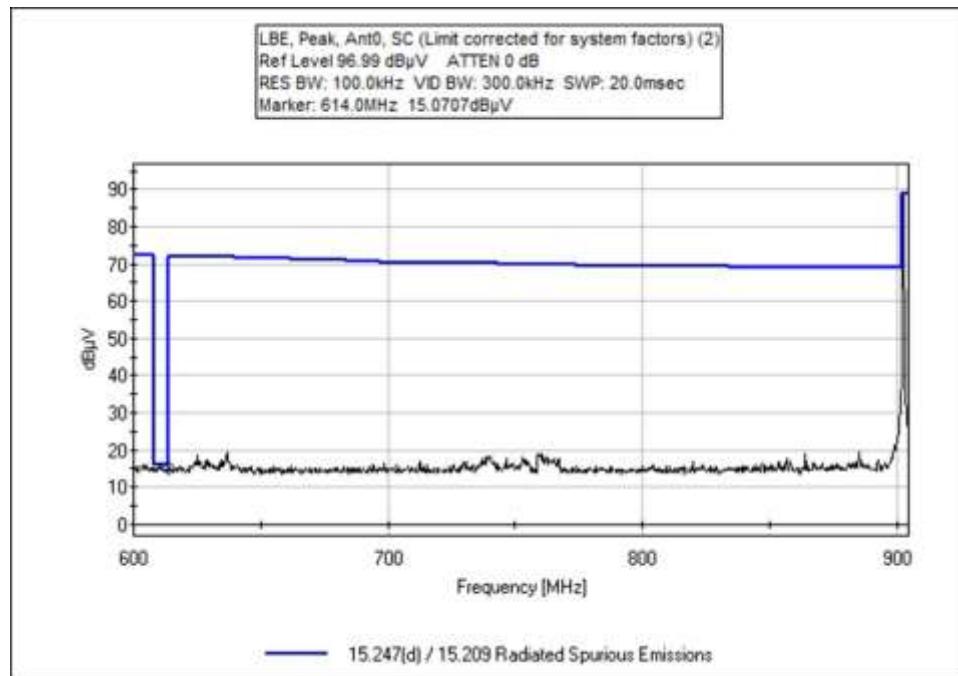
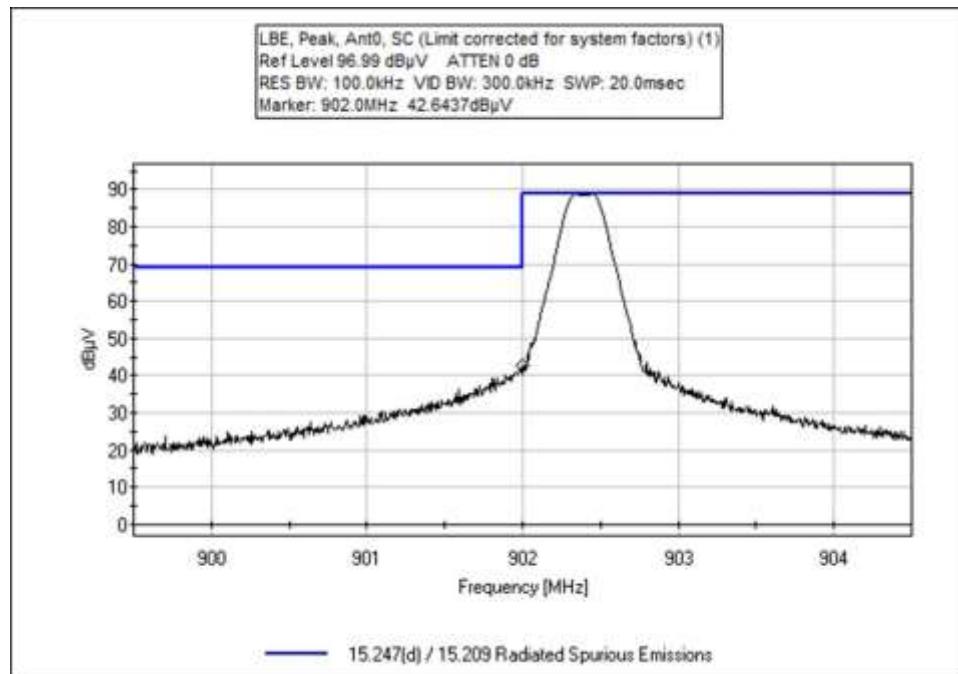
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614 (Port 0)	GFSK-2	Swivel Type Dipole	39.6	<46	Pass
902 (Port 0)	GFSK-2	Swivel Type Dipole	76	<102.4	Pass
928 (Port 0)	GFSK-2	Swivel Type Dipole	72.1	<102.4	Pass
960 (Port 0)	GFSK-2	Swivel Type Dipole	46.4	<54	Pass
614 (Port 1)	GFSK-2	Swivel Type Dipole	39.5	<46	Pass
902 (Port 1)	GFSK-2	Swivel Type Dipole	75.7	<102.4	Pass
928 (Port 1)	GFSK-2	Swivel Type Dipole	69.2	<102.4	Pass
960 (Port 1)	GFSK-2	Swivel Type Dipole	46.1	<54	Pass

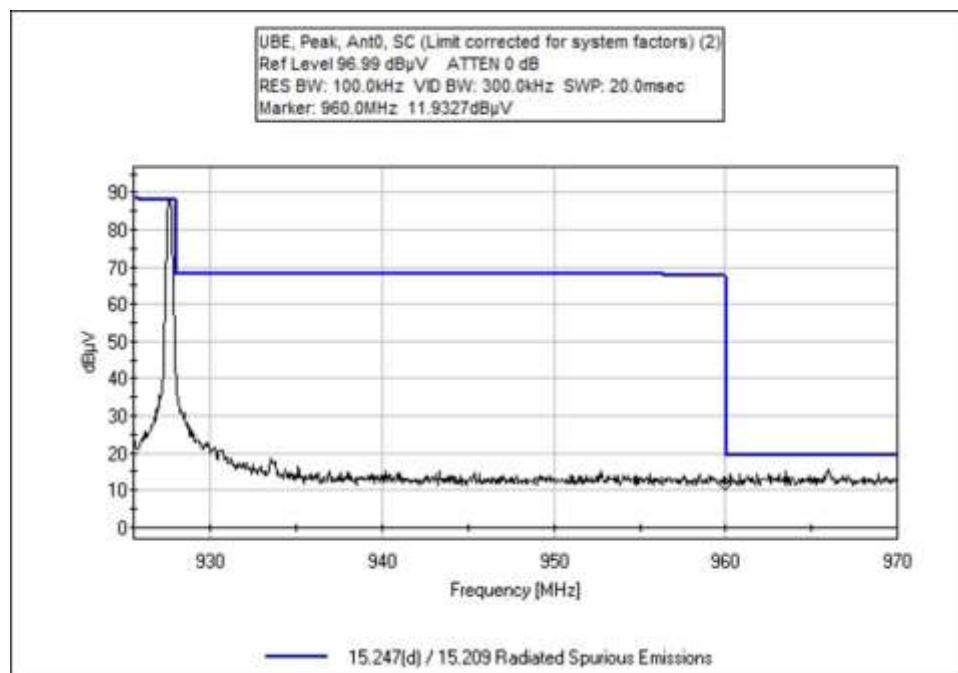
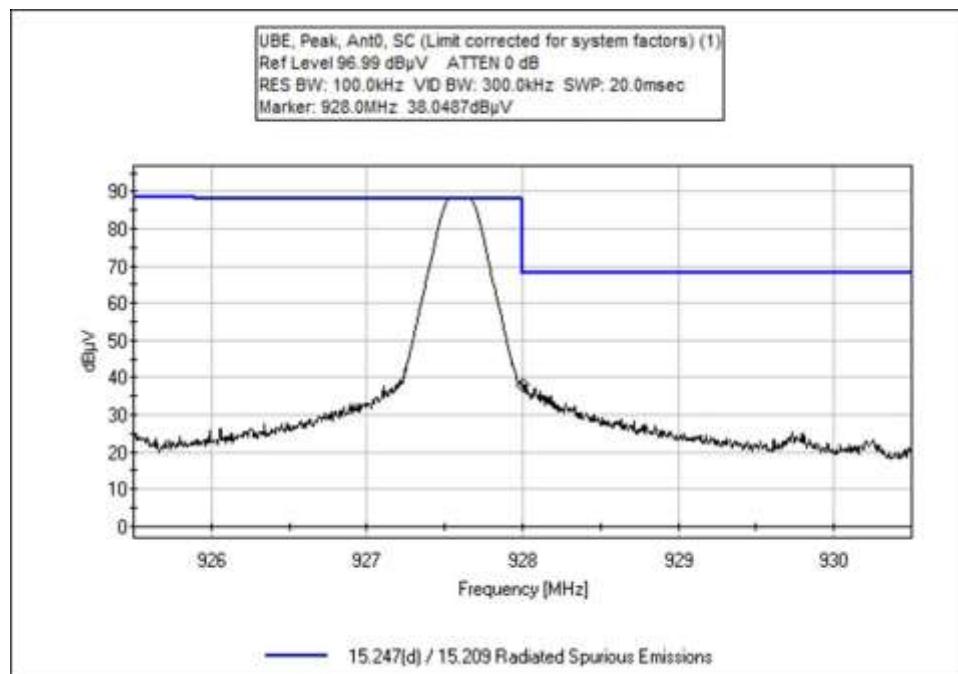
### Band Edge Summary

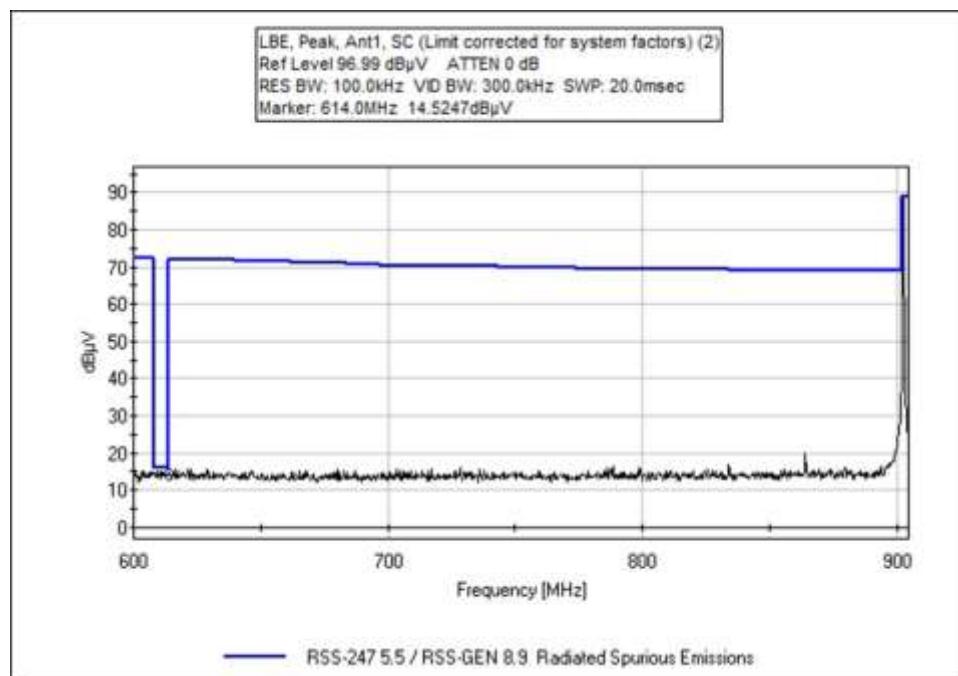
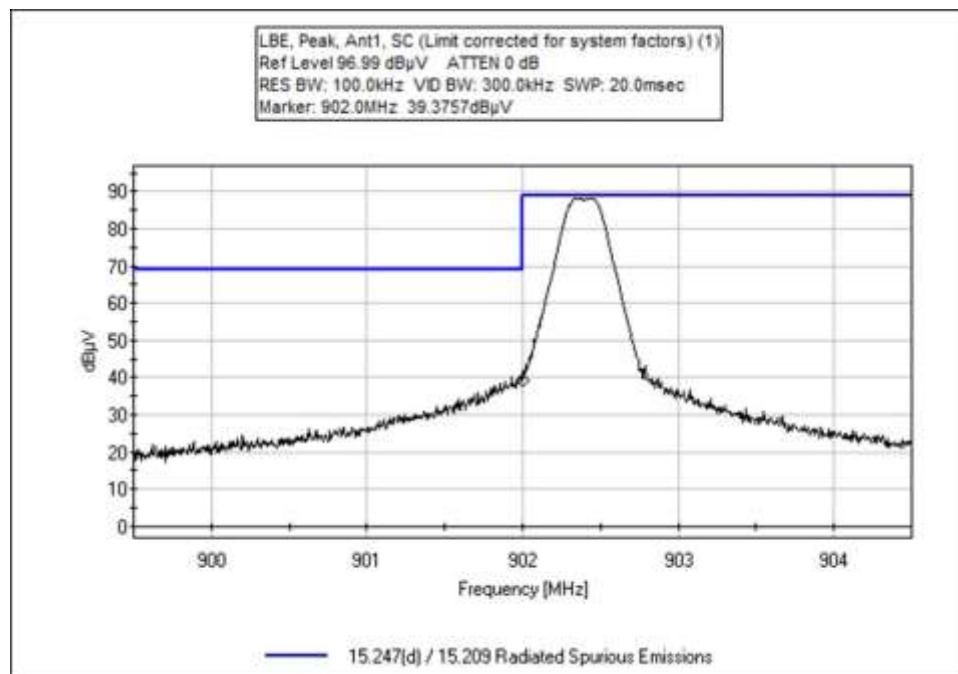
Operating Mode: Hopping

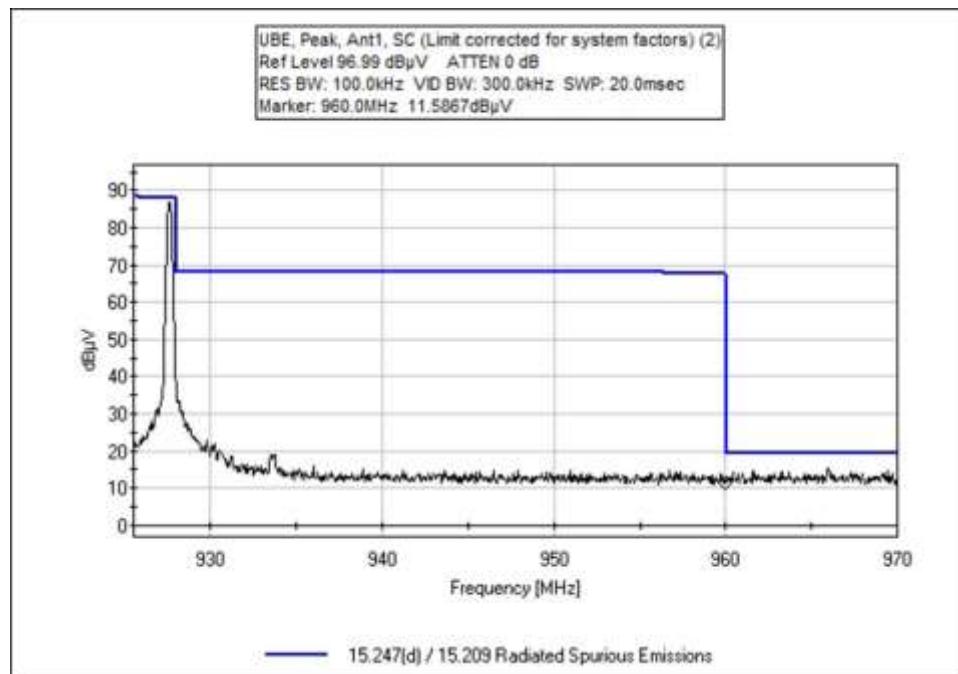
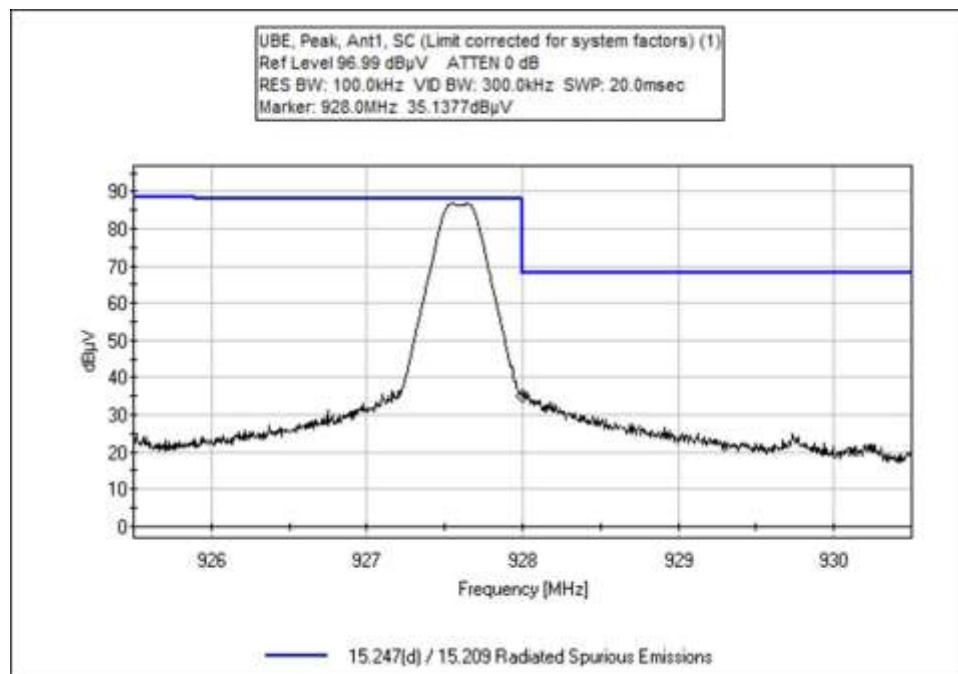
Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
614 (Port 0)	GFSK-2	Swivel Type Dipole	39.5	<46	Pass
902 (Port 0)	GFSK-2	Swivel Type Dipole	79.8	<102.4	Pass
928 (Port 0)	GFSK-2	Swivel Type Dipole	65.8	<102.4	Pass
960 (Port 0)	GFSK-2	Swivel Type Dipole	43.8	<54	Pass
614 (Port 1)	GFSK-2	Swivel Type Dipole	39.5	<46	Pass
902 (Port 1)	GFSK-2	Swivel Type Dipole	79	<102.4	Pass
928 (Port 1)	GFSK-2	Swivel Type Dipole	70	<102.4	Pass
960 (Port 1)	GFSK-2	Swivel Type Dipole	43.9	<54	Pass

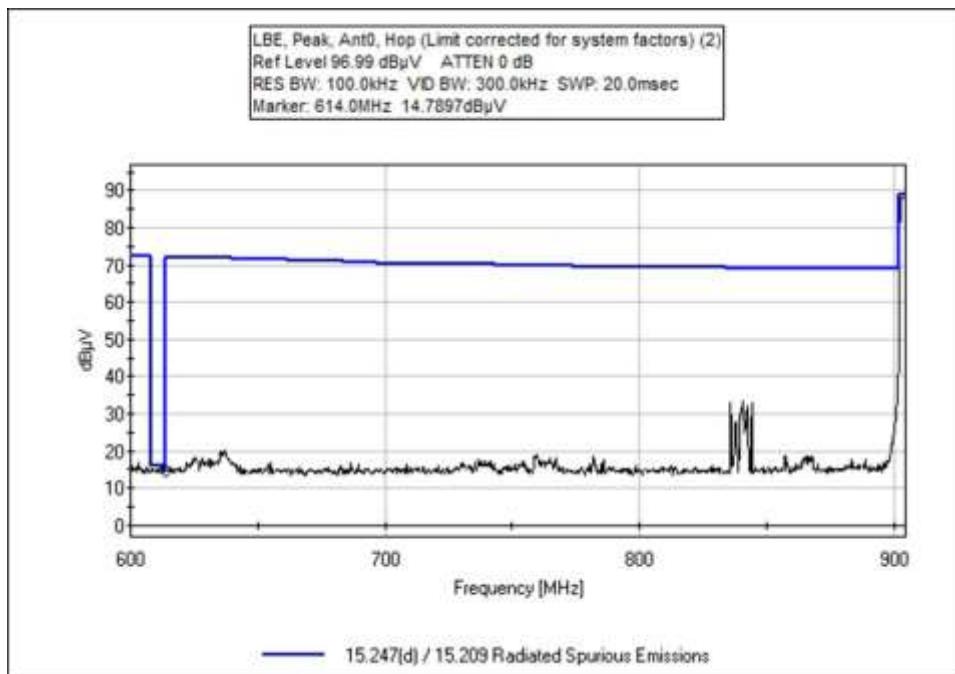
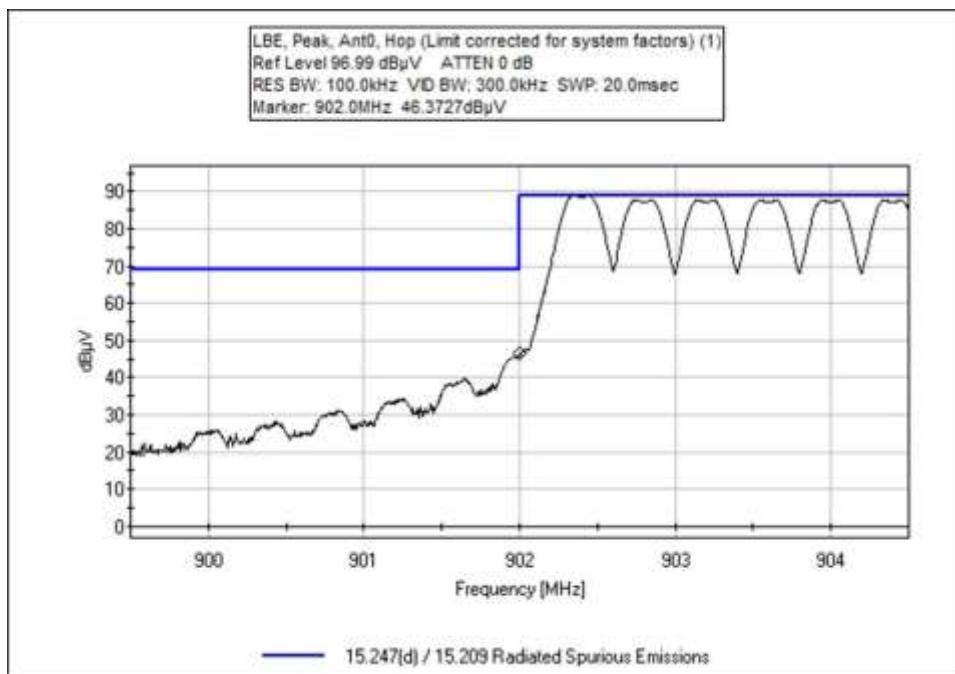
## Band Edge Plots

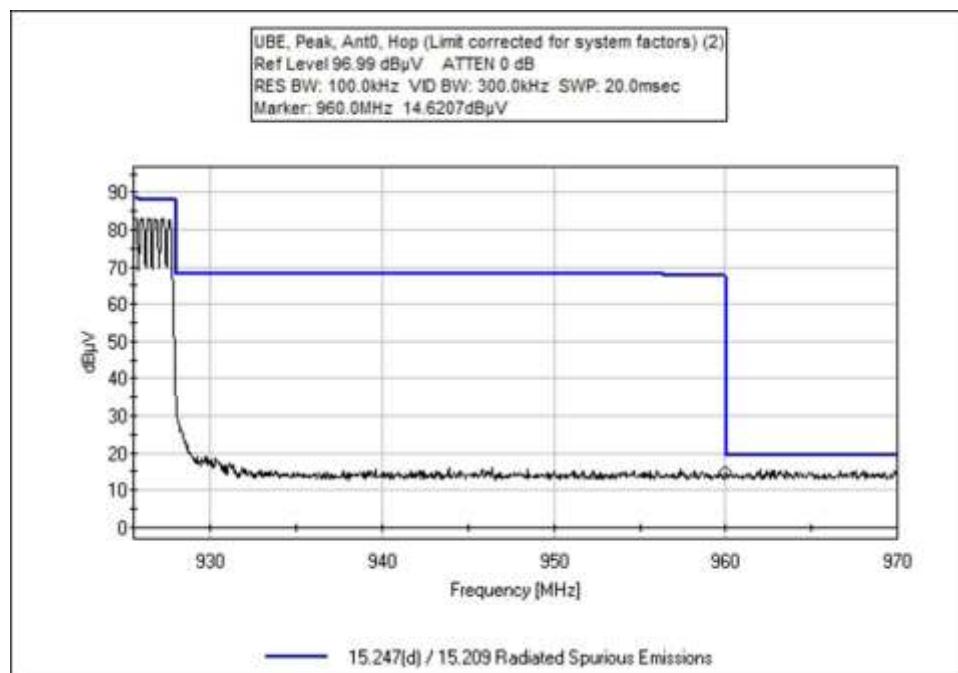
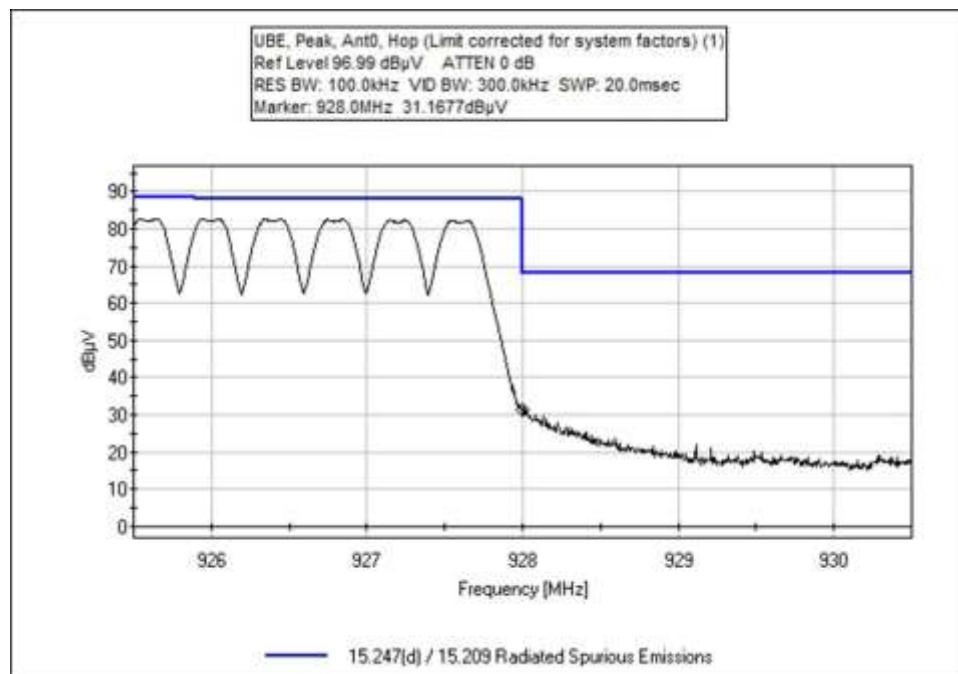


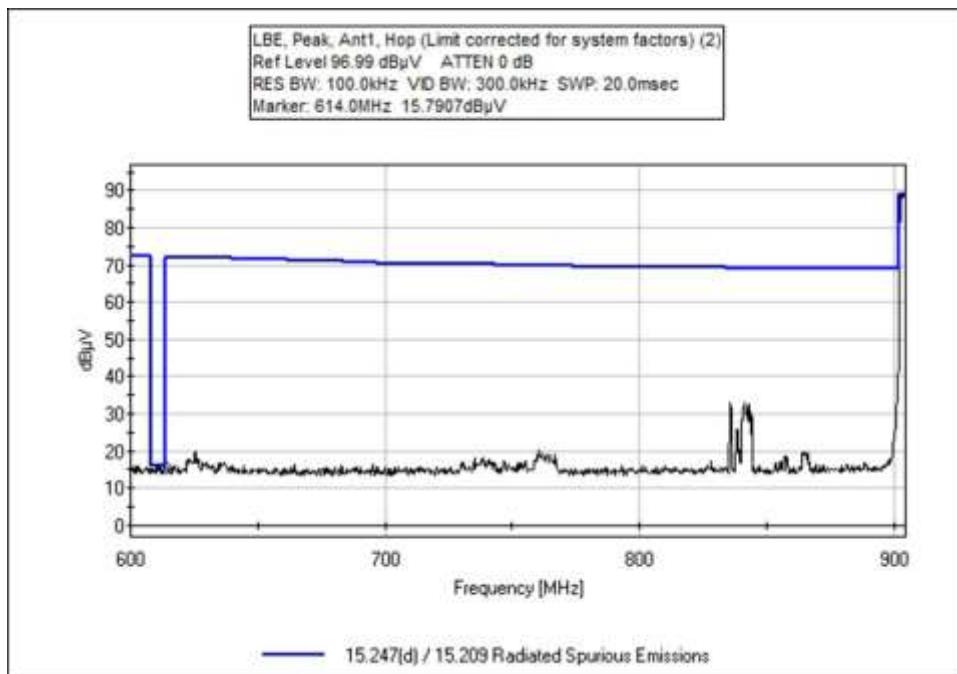
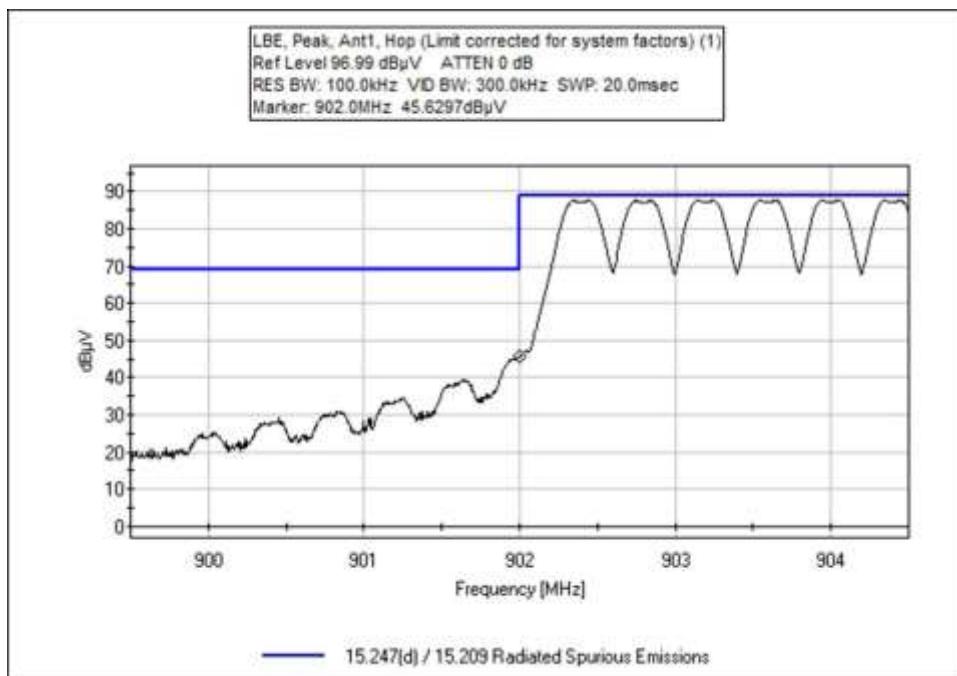


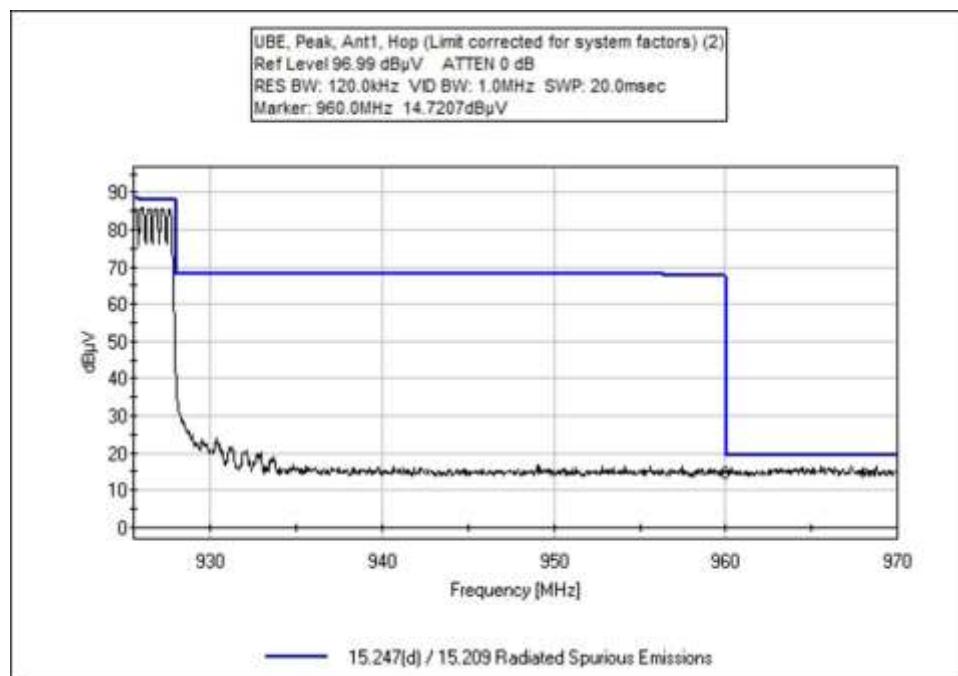
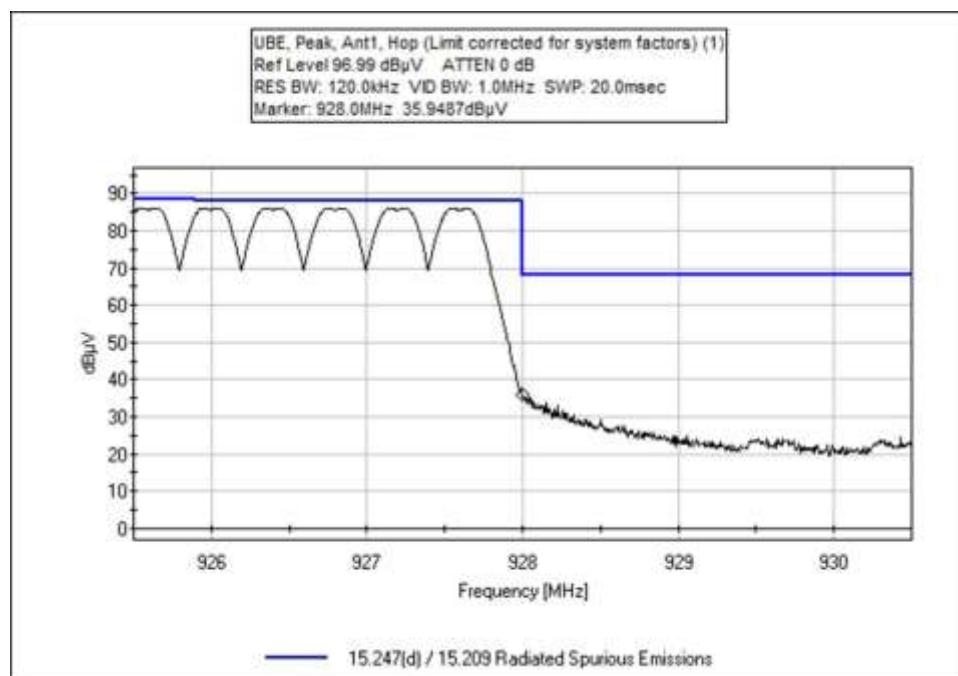












## Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 9802 • 1-800-500-4EMC (4362)  
 Customer: **Nalloy, LLC**  
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
 Work Order #: **104760** Date: 12/17/2020  
 Test Type: **Maximized Emissions** Time: 15:51:38  
 Tested By: M. Harrison/M. Atkinson Sequence#: 8  
 Software: EMITest 5.03.19

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Test Environment Conditions:
Temperature: 20°C
Relative Humidity: 33%
Pressure: 102.1kPa
Test Method: ANSI C63.10: 2013
Frequency Range: 614-960 MHz
Setup:
SBS Module
Antenna 0
Low Channel (0) 902.4 MHz, High (63) 927.6MHz
GFSK-2
100% Duty Cycle
PWR Level Setting: 200
PWR Output: 20dBm
POE powered.

***Test Equipment:***

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T2	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T3	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T4	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T5	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T6	ANP05360	Cable	RG214	2/3/2020	2/3/2022

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6			Table	dB $\mu$ V/m	dB $\mu$ V/m		
			MHz	dB $\mu$ V	dB	dB	dB				Ant
1	902.343M	89.0	+0.0	+0.3	+23.8	+5.8	+0.0	122.4	122.4	+0.0	Vert
			+1.4	+2.1							SC
2	614.000M	9.4	+0.0	+0.3	+21.2	+5.8	+0.0	39.6	46.0	-6.4	Vert
	QP		+1.2	+1.7							SC
3	614.000M	9.3	+0.0	+0.3	+21.2	+5.8	+0.0	39.5	46.0	-6.5	Vert
	QP		+1.2	+1.7							Hop
^	614.000M	15.1	+0.0	+0.3	+21.2	+5.8	+0.0	45.3	46.0	-0.7	Vert
			+1.2	+1.7							SC
^	614.000M	14.8	+0.0	+0.3	+21.2	+5.8	+0.0	45.0	46.0	-1.0	Vert
			+1.2	+1.7							Hop
6	960.000M	9.3	+0.0	+0.4	+24.6	+5.8	+0.0	43.8	54.0	-10.2	Vert
	QP		+1.5	+2.2							Hop
^	960.000M	14.6	+0.0	+0.4	+24.6	+5.8	+0.0	49.1	54.0	-4.9	Vert
			+1.5	+2.2							Hop
^	960.000M	11.9	+0.0	+0.4	+24.6	+5.8	+0.0	46.4	54.0	-7.6	Vert
			+1.5	+2.2							SC
9	902.000M	46.4	+0.0	+0.3	+23.8	+5.8	+0.0	79.8	102.4	-22.6	Vert
			+1.4	+2.1							Hop
10	902.000M	42.6	+0.0	+0.3	+23.8	+5.8	+0.0	76.0	102.4	-26.4	Vert
			+1.4	+2.1							SC
11	928.000M	38.0	+0.0	+0.4	+24.2	+5.8	+0.0	72.1	102.4	-30.3	Vert
			+1.5	+2.2							SC
12	928.000M	31.2	+0.0	+0.4	+24.2	+5.8	+0.0	65.3	102.4	-37.1	Vert
			+1.5	+2.2							Hop



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC (4362)  
Customer: **Nalloy, LLC**  
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**  
Work Order #: **104760** Date: 12/17/2020  
Test Type: **Maximized Emissions** Time: 16:06:58  
Tested By: M. Harrison/M. Atkinson Sequence#: 9  
Software: EMITest 5.03.19

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 1			

***Test Conditions / Notes:***

Test Environment Conditions:
Temperature: 20°C
Relative Humidity: 33%
Pressure: 102.1kPa
Test Method: ANSI C63.10: 2013
Frequency Range: 600-970MHz
Setup:
SBS Module
Antenna 1
Low Channel (0) 902.4 MHz, High (63) 927.6MHz
GFSK-2
100% Duty Cycle
PWR Level Setting: 200
PWR Output: 20dBm
POE powered.

***Test Equipment:***

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T2	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T3	AN03628	Biconilog Antenna	3142E	6/11/2019	6/11/2021
T4	ANP06123	Attenuator	18N-6	4/5/2019	4/5/2021
T5	ANP05305	Cable	ETSI-50T	9/6/2019	9/6/2021
T6	ANP05360	Cable	RG214	2/3/2020	2/3/2022

<b>Measurement Data:</b>			Reading listed by margin.				Test Distance: 3 Meters				
#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6			Table	dB $\mu$ V/m	dB $\mu$ V/m		
			MHz	dB $\mu$ V	dB	dB	dB				Ant
1	614.000M	9.3	+0.0	+0.3	+21.2	+5.8	+0.0	39.5	46.0	-6.5	Vert
	QP		+1.2	+1.7					Hop		
2	614.000M	9.3	+0.0	+0.3	+21.2	+5.8	+0.0	39.5	46.0	-6.5	Vert
	QP		+1.2	+1.7					SC		
^	614.000M	15.8	+0.0	+0.3	+21.2	+5.8	+0.0	46.0	46.0	+0.0	Vert
			+1.2	+1.7					Hop		
^	614.000M	14.5	+0.0	+0.3	+21.2	+5.8	+0.0	44.7	46.0	-1.3	Vert
			+1.2	+1.7					SC		
5	960.000M	9.4	+0.0	+0.4	+24.6	+5.8	+0.0	43.9	54.0	-10.1	Vert
	QP		+1.5	+2.2					Hop		
^	960.000M	14.7	+0.0	+0.4	+24.6	+5.8	+0.0	49.2	54.0	-4.8	Vert
			+1.5	+2.2					Hop		
^	960.000M	11.6	+0.0	+0.4	+24.6	+5.8	+0.0	46.1	54.0	-7.9	Vert
			+1.5	+2.2					SC		
8	902.000M	45.6	+0.0	+0.3	+23.8	+5.8	+0.0	79.0	102.4	-23.4	Vert
			+1.4	+2.1					Hop		
9	902.000M	42.3	+0.0	+0.3	+23.8	+5.8	+0.0	75.7	102.4	-26.7	Vert
			+1.4	+2.1					SC		
10	928.000M	35.9	+0.0	+0.4	+24.2	+5.8	+0.0	70.0	102.4	-32.4	Vert
			+1.5	+2.2					Hop		
11	928.000M	35.1	+0.0	+0.4	+24.2	+5.8	+0.0	69.2	102.4	-33.2	Vert
			+1.5	+2.2					SC		

## 15.207 AC Conducted Emissions

### Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC  
 Customer: **Nalloy, LLC**  
 Specification: **15.207 AC Mains - Average**  
 Work Order #: **104760** Date: 12/14/2020  
 Test Type: **Conducted Emissions** Time: 10:09:11  
 Tested By: Michael Atkinson Sequence#: 14  
 Software: EMITest 5.03.19 115VAC 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 2			

***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 2			

***Test Conditions / Notes:***

Test Environment Conditions:

Temperature: 19°C

Relative Humidity: 34%

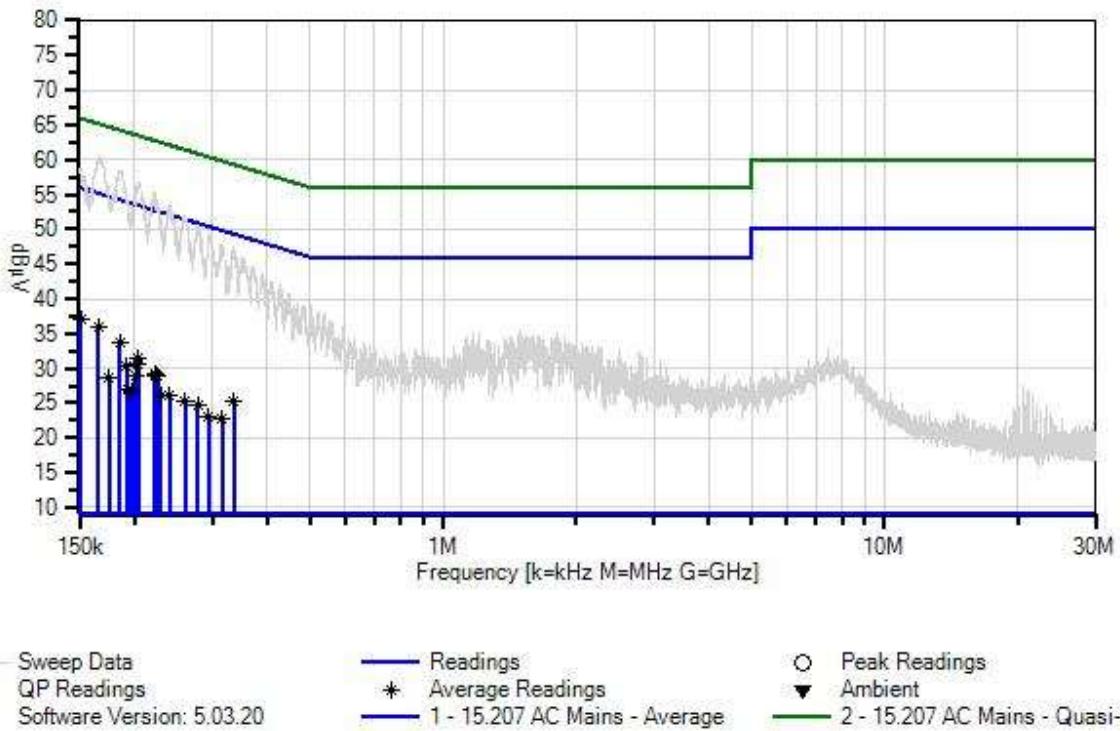
Pressure: 102.0kPa

Test Method: ANSI C63.10 (2013)

Frequency Range: 0.15-30MHz

Setup:

Continuously transmitting. Antenna 0 and antenna 1 investigated, worst case reported. Low, mid, and high channels investigated, worst case reported.

Nalloy, LLC WO#: 104760 Sequence#: 14 Date: 12/14/2020  
 15.207 AC Mains - Average Test Lead: 115VAC 60Hz Line

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022
T2	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
T5	AN01311	50uH LISN-Line1 (L)	3816/2	2/24/2020	2/24/2022
	AN01311	50uH LISN-Line2 (N)	3816/2	2/24/2020	2/24/2022

<b>Measurement Data:</b>			Reading listed by margin.				Test Lead: Line				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar
1	150.943k Ave	24.6 -1.8	+1.6	+0.0	+0.0	+9.1	+0.0	37.1	55.9	-18.8	Line
^	150.943k	49.9 -1.8	+1.6	+0.0	+0.0	+9.1	+0.0	62.4	55.9	+6.5	Line
3	165.824k Ave	24.6 -1.6	+0.5	+0.0	+0.0	+9.1	+0.0	35.8	55.2	-19.4	Line
^	165.824k	52.6 -1.6	+0.5	+0.0	+0.0	+9.1	+0.0	63.8	55.2	+8.6	Line
5	185.212k Ave	23.0 -1.3	+0.3	+0.0	+0.0	+9.1	+0.0	33.7	54.2	-20.5	Line
^	185.212k	50.5 -1.3	+0.3	+0.0	+0.0	+9.1	+0.0	61.2	54.2	+7.0	Line
7	204.495k Ave	21.1 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	31.6	53.4	-21.8	Line
8	203.237k Ave	20.0 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	30.5	53.5	-23.0	Line
9	221.891k Ave	18.9 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	29.3	52.7	-23.4	Line
10	222.625k Ave	18.6 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	29.0	52.7	-23.7	Line
11	225.664k Ave	18.5 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	28.9	52.6	-23.7	Line
^	221.891k	46.9 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	57.3	52.7	+4.6	Line
^	222.625k	46.9 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	57.3	52.7	+4.6	Line
14	191.500k Ave	19.5 -1.3	+0.3	+0.0	+0.0	+9.1	+0.0	30.2	54.0	-23.8	Line
15	335.437k Ave	15.4 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	25.2	49.3	-24.1	Line
^	335.437k	38.9 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	48.7	49.3	-0.6	Line
17	200.932k Ave	18.5 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	29.0	53.6	-24.6	Line
^	204.494k	48.7 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	59.2	53.4	+5.8	Line
^	203.237k	48.7 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	59.2	53.5	+5.7	Line
20	239.602k Ave	15.9 -1.0	+0.2	+0.0	+0.0	+9.1	+0.0	26.2	52.1	-25.9	Line
^	239.602k	45.2 -1.0	+0.2	+0.0	+0.0	+9.1	+0.0	55.5	52.1	+3.4	Line
22	259.781k Ave	15.2 -0.9	+0.2	+0.0	+0.0	+9.1	+0.0	25.4	51.4	-26.0	Line
^	259.781k	43.6 -0.9	+0.2	+0.0	+0.0	+9.1	+0.0	53.8	51.4	+2.4	Line

24	175.152k	17.7	+0.4	+0.0	+0.0	+9.1	+0.0	28.6	54.7	-26.1	Line
	Ave		-1.4								
^	175.151k	47.6	+0.4	+0.0	+0.0	+9.1	+0.0	58.5	54.7	+3.8	Line
			-1.4								
26	278.651k	14.7	+0.1	+0.0	+0.0	+9.1	+0.0	24.7	50.9	-26.2	Line
	Ave		-0.8								
^	278.650k	42.0	+0.1	+0.0	+0.0	+9.1	+0.0	52.0	50.9	+1.1	Line
			-0.8								
28	229.332k	15.6	+0.3	+0.0	+0.0	+9.1	+0.0	26.0	52.5	-26.5	Line
	Ave		-1.0								
^	225.664k	45.9	+0.3	+0.0	+0.0	+9.1	+0.0	56.3	52.6	+3.7	Line
			-1.0								
^	229.332k	43.2	+0.3	+0.0	+0.0	+9.1	+0.0	53.6	52.5	+1.1	Line
			-1.0								
31	315.856k	13.0	+0.1	+0.0	+0.0	+9.1	+0.0	22.9	49.8	-26.9	Line
	Ave		-0.7								
^	315.855k	39.4	+0.1	+0.0	+0.0	+9.1	+0.0	49.3	49.8	-0.5	Line
			-0.7								
33	194.015k	16.3	+0.3	+0.0	+0.0	+9.1	+0.0	26.9	53.9	-27.0	Line
	Ave		-1.2								
^	191.500k	47.7	+0.3	+0.0	+0.0	+9.1	+0.0	58.4	54.0	+4.4	Line
			-1.3								
35	197.578k	16.2	+0.2	+0.0	+0.0	+9.1	+0.0	26.7	53.7	-27.0	Line
	Ave		-1.2								
^	200.931k	47.9	+0.2	+0.0	+0.0	+9.1	+0.0	58.4	53.6	+4.8	Line
			-1.2								
^	197.578k	45.1	+0.2	+0.0	+0.0	+9.1	+0.0	55.6	53.7	+1.9	Line
			-1.2								
^	194.015k	45.0	+0.3	+0.0	+0.0	+9.1	+0.0	55.6	53.9	+1.7	Line
			-1.2								
39	294.672k	13.2	+0.1	+0.0	+0.0	+9.1	+0.0	23.1	50.4	-27.3	Line
	Ave		-0.7								
^	294.672k	40.7	+0.1	+0.0	+0.0	+9.1	+0.0	50.6	50.4	+0.2	Line
			-0.7								



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 1-800-500-4EMC  
Customer: **Nalloy, LLC**  
Specification: **15.207 AC Mains - Average**  
Work Order #: **104760** Date: 12/14/2020  
Test Type: **Conducted Emissions** Time: 09:58:57  
Tested By: Michael Atkinson Sequence#: 13  
Software: EMITest 5.03.19 115VAC 60Hz

***Equipment Tested:***

Device	Manufacturer	Model #	S/N
Configuration 2			

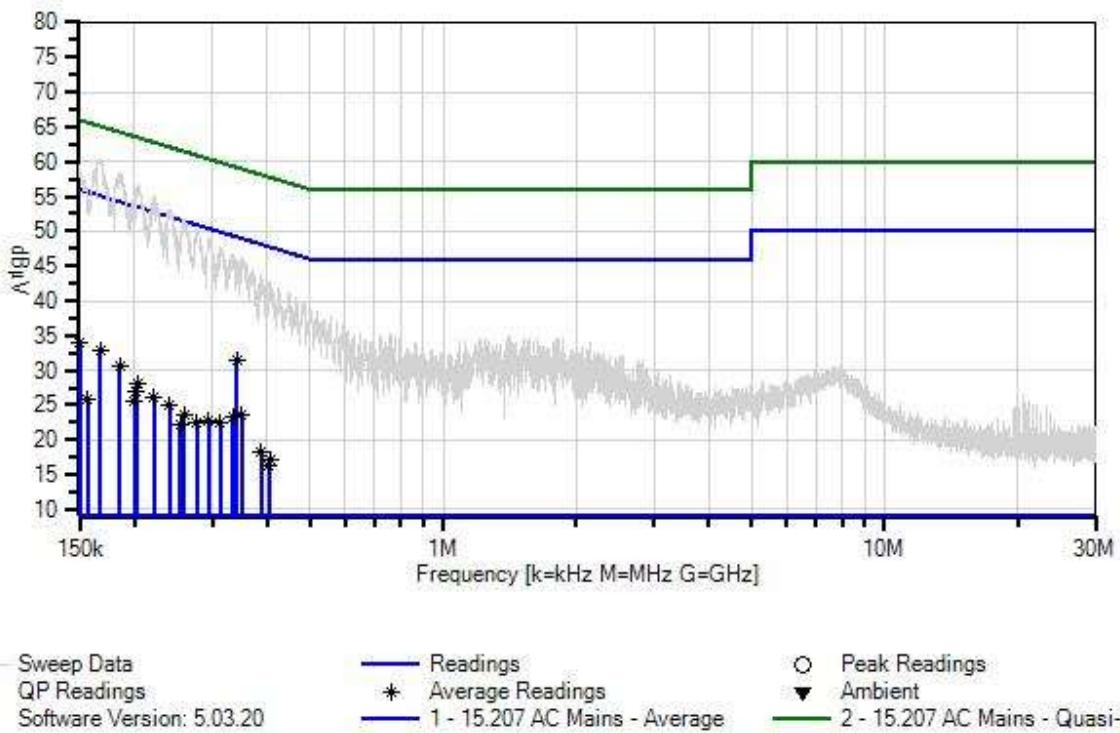
***Support Equipment:***

Device	Manufacturer	Model #	S/N
Configuration 2			

***Test Conditions / Notes:***

Test Environment Conditions: Temperature: 19°C Relative Humidity: 34% Pressure: 102.0kPa
Test Method: ANSI C63.10 (2013)
Frequency Range: 0.15-30MHz

Setup:  
Continuously transmitting. Antenna 0 and antenna 1 investigated, worst case reported. Low, mid, and high channels investigated, worst case reported.

Nalloy, LLC WO#: 104760 Sequence#: 13 Date: 12/14/2020  
 15.207 AC Mains - Average Test Lead: 115VAC 60Hz Neutral

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/22/2019	2/22/2021
T1	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022
T2	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
T3	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T4	ANP06219	Attenuator	768-10	4/7/2020	4/7/2022
	AN01311	50uH LISN-Line1 (L)	3816/2	2/24/2020	2/24/2022
T5	AN01311	50uH LISN-Line2 (N)	3816/2	2/24/2020	2/24/2022

<b>Measurement Data:</b>			Reading listed by margin.				Test Lead: Neutral				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar
1	340.244k Ave	22.8 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	31.4	49.2	-17.8	Neutr
^	340.243k	37.2 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	45.8	49.2	-3.4	Neutr
3	150.104k Ave	24.3 -1.8	+2.4	+0.0	+0.0	+9.1	+0.0	34.0	56.0	-22.0	Neutr
^	150.103k	50.0 -1.8	+2.4	+0.0	+0.0	+9.1	+0.0	59.7	56.0	+3.7	Neutr
5	167.605k Ave	24.8 -1.5	+0.4	+0.0	+0.0	+9.1	+0.0	32.8	55.1	-22.3	Neutr
^	167.605k	52.5 -1.5	+0.4	+0.0	+0.0	+9.1	+0.0	60.5	55.1	+5.4	Neutr
7	185.421k Ave	22.6 -1.3	+0.3	+0.0	+0.0	+9.1	+0.0	30.7	54.2	-23.5	Neutr
^	185.420k	50.3 -1.3	+0.3	+0.0	+0.0	+9.1	+0.0	58.4	54.2	+4.2	Neutr
9	203.236k Ave	20.1 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	28.2	53.5	-25.3	Neutr
10	350.213k Ave	14.9 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	23.5	49.0	-25.5	Neutr
^	350.212k	37.9 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	46.5	49.0	-2.5	Neutr
12	333.301k Ave	14.7 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	23.3	49.4	-26.1	Neutr
^	333.301k	38.2 -0.6	+0.1	+0.0	+0.0	+9.1	+0.0	46.8	49.4	-2.6	Neutr
14	221.052k Ave	17.7 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	26.1	52.8	-26.7	Neutr
^	221.052k	46.8 -1.0	+0.3	+0.0	+0.0	+9.1	+0.0	55.2	52.8	+2.4	Neutr
16	201.350k Ave	18.8 -1.2	+0.2	+0.0	+0.0	+9.1	+0.0	26.9	53.6	-26.7	Neutr
17	240.440k Ave	16.7 -0.9	+0.2	+0.0	+0.0	+9.1	+0.0	25.1	52.1	-27.0	Neutr
^	240.439k	44.8 -0.9	+0.2	+0.0	+0.0	+9.1	+0.0	53.2	52.1	+1.1	Neutr
19	312.652k Ave	14.0 -0.7	+0.1	+0.0	+0.0	+9.1	+0.0	22.5	49.9	-27.4	Neutr
^	312.651k	39.2 -0.7	+0.1	+0.0	+0.0	+9.1	+0.0	47.7	49.9	-2.2	Neutr
21	293.960k Ave	14.2 -0.7	+0.1	+0.0	+0.0	+9.1	+0.0	22.7	50.4	-27.7	Neutr
^	293.960k	40.6 -0.7	+0.1	+0.0	+0.0	+9.1	+0.0	49.1	50.4	-1.3	Neutr
23	258.713k Ave	15.0 -0.8	+0.2	+0.0	+0.0	+9.1	+0.0	23.5	51.5	-28.0	Neutr

24	199.988k	17.4	+0.2	+0.0	+0.0	+9.1	+0.0	25.5	53.6	-28.1	Neutr
	Ave		-1.2								
^	203.236k	48.5	+0.2	+0.0	+0.0	+9.1	+0.0	56.6	53.5	+3.1	Neutr
			-1.2								
^	201.350k	48.1	+0.2	+0.0	+0.0	+9.1	+0.0	56.2	53.6	+2.6	Neutr
			-1.2								
^	199.987k	47.1	+0.2	+0.0	+0.0	+9.1	+0.0	55.2	53.6	+1.6	Neutr
			-1.2								
28	276.515k	14.0	+0.1	+0.0	+0.0	+9.1	+0.0	22.4	50.9	-28.5	Neutr
	Ave		-0.8								
^	276.514k	41.8	+0.1	+0.0	+0.0	+9.1	+0.0	50.2	50.9	-0.7	Neutr
			-0.8								
30	254.273k	13.7	+0.2	+0.0	+0.0	+9.1	+0.0	22.2	51.6	-29.4	Neutr
	Ave		-0.8								
^	258.713k	43.3	+0.2	+0.0	+0.0	+9.1	+0.0	51.8	51.5	+0.3	Neutr
			-0.8								
^	254.273k	41.5	+0.2	+0.0	+0.0	+9.1	+0.0	50.0	51.6	-1.6	Neutr
			-0.8								
33	387.417k	9.4	+0.2	+0.0	+0.0	+9.1	+0.0	18.2	48.1	-29.9	Neutr
	Ave		-0.5								
^	387.417k	35.2	+0.2	+0.0	+0.0	+9.1	+0.0	44.0	48.1	-4.1	Neutr
			-0.5								
35	156.706k	17.6	+0.7	+0.0	+0.0	+9.1	+0.0	25.7	55.6	-29.9	Neutr
	Ave		-1.7								
^	156.706k	48.2	+0.7	+0.0	+0.0	+9.1	+0.0	56.3	55.6	+0.7	Neutr
			-1.7								
37	405.041k	8.3	+0.2	+0.0	+0.0	+9.1	+0.0	17.1	47.7	-30.6	Neutr
	Ave		-0.5								
38	402.727k	7.6	+0.2	+0.0	+0.0	+9.1	+0.0	16.4	47.8	-31.4	Neutr
	Ave		-0.5								
^	405.040k	34.1	+0.2	+0.0	+0.0	+9.1	+0.0	42.9	47.7	-4.8	Neutr
			-0.5								
^	402.726k	33.8	+0.2	+0.0	+0.0	+9.1	+0.0	42.6	47.8	-5.2	Neutr
			-0.5								

## SUPPLEMENTAL INFORMATION

### Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

### Emissions Test Details

#### TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

#### CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB $\mu$ V/m, the spectrum analyzer reading in dB $\mu$ V was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS	
Meter reading	(dB $\mu$ V)
+ Antenna Factor	(dB/m)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	(dB $\mu$ V/m)

## TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

## SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

### Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

### Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

### Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.

## APPENDIX A: TEST SETUP PHOTOS

### EUT and Accessory Photo(s)



Equipment Under Test



Antenna

#### Support Equipment Photo(s)



Laptop



PoE Injector, Configuration 1



PoE Injector, Configuration 2 and 3



Antenna Port 0



Antenna Port 1



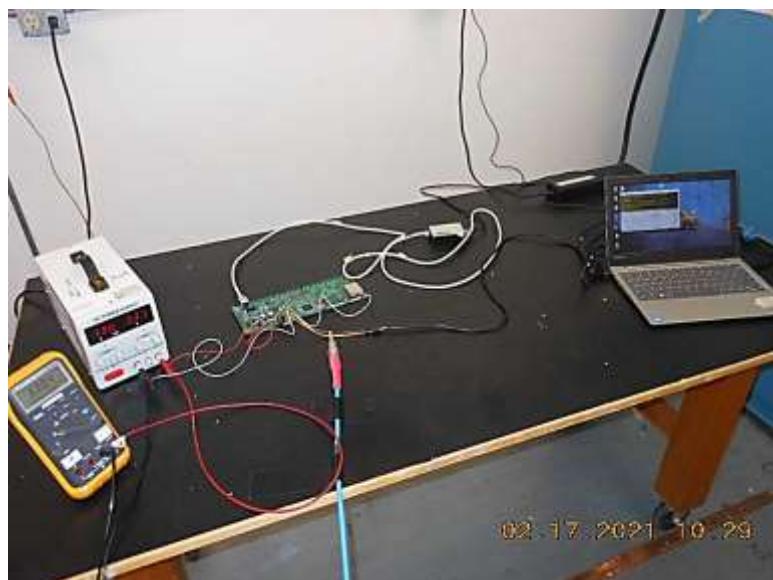
Dwell Time



Antenna Port 0



Antenna Port 1



Voltage Variation



X – Axis



Y – Axis



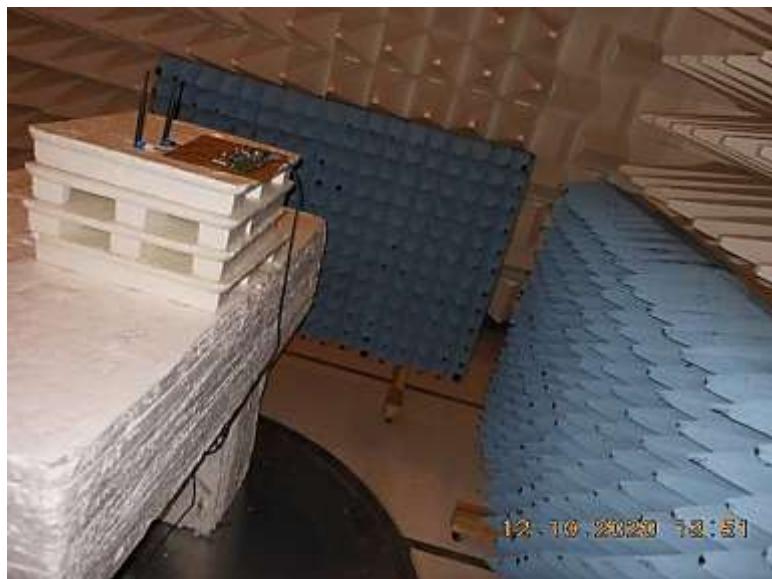
Z – Axis



Antenna Port 0



Below 1GHz



Above 1GHz

